Volume 93 Number 13

STEEL

For forty-eight Years—IRON TRADE REVIEW

PRODUCTION • PROCESSING • DISTRIBUTION • USE

The Week in Perspective

DESPITE the befogging influence of codes, labor disputes, price uncertainties and a murky outlook for new business, that great American institution—the convention—carries on. Steel and metal minded executives and engineers for the moment are turning away from cheering a hesitant recovery march and focusing their attention upon the forthcoming National Metal congress and exposition (pp. 37-64) which opens in Detroit, Oct. 2, continuing through the week. The event is sponsored by the American Society for Steel Treating, and four other national engineering groups are participating, the result being a week replete with interesting technical sessions, plant inspection trips, and exhibits of metals and equipment for processing them. About 135 companies are displaying their products in this fifteenth annual metal show.

New Contracts To Be Heat-Treated

Customers of the larger producers also have been treating steel—with disdain. Prices on heavy finished steel being withdrawn and users of flat-rolled products concentrating on specifying, new business has been negligible (p. 77). But now come advances of $2 on plates and shapes and $3 on bars, certain to drive in some business for the fourth quarter. With these advances, however, revised modes of contracting compel a more exacting scrutiny of requirements; consumers hereafter must take out all of their contract obligations or must place a stated percentage of their requirements with various sources of supply.

New Faces In Institute; Campbell Departs

To administer these new prices and regulations, a reorganization of the American Iron and Steel institute staff is in process (p. 11). As executive secretary, Walter S. Tower (p. 19) virtually combines a presidency and a secretaryship. . . . A new director of the institute is Henry Roemer (p. 11), successor to Severn P. Ker as chairman of Sharon Steel Hoop Co. (p. 19). . . . An honorary vice president of the institute on whom the book is now closed is James A. Campbell, veteran of the iron and steel industry and long the guiding genius of the Youngstown Sheet & Tube Co. (p. 18); for 43 years a factor in every important advance of the industry in the Mahoning valley.

Fear Blue Eagle Is Grounded

That was a swagger stick and not a magic wand that General Johnson has been beating the air with, Washington is learning (p. 13), and the louder the talk of inflation becomes the more certain it is that NRA has failed to skyrocket business. Only the President stands

Wide World Photo

Railplane may travel 100 miles an hour: The plane demonstrated near Glasgow is suspended from trucks, running on overhead tracks, with guide rail to prevent sidesway. It is driven by propellers. London may adopt it as part of a plan for slum clearance

between currency inflation and an increasingly restive Democracy, and the manner in which the President handles congress may be decisive on his fortunes. . . . Regardless of NRA, automobile manufacturers are making history. August output bettered that of July; September is seasonally high (p. 17). Low-price car makers face a unique test in 1934, provided prosperity returns.

Uniformity Feature of New Forging Steel

Development of special-purpose steels is largely responsible for making the modern automobile the efficient and dependable mechanism it is. But steelmakers have not relaxed in their efforts to provide new and better steels for automotive use. Thus, a new manganese-chromium-vanadium analysis is proposed (p. 23) to furnish an intermediate alloy steel for use in medium-stressed forgings such as crankshafts, connecting rods, steering arms and the like. In the normalized condition the steel shows highly uniform physical properties. . . . In England a process involving an aluminothermic reaction has been developed for production of corrosion-resisting material using (p. 34) steel or cast iron as a base.

Study Behavior of Rolls in Service

Analysis of external friction forces involved in rolling (p. 71) gives some conception of the great influence which these forces have upon deformation as well as upon the pressure required to carry it out . . . An authority on roll grinding reports (p. 41) that uneven spiral marks, which frequently occur on the surface of thin-walled rolls, sometimes are caused by unequal temperature of the steel . . . . Modern methods of treating steel are exemplified (p. 27) in the plant of a Pittsburgh bolt manufacturer. Numerous types of gas-fired furnaces provide accurate control over physical properties of the finished product.

Saving Time and Cash by Means of Welding

In routing the haulage track from a newly constructed mine opening, a Wyoming coal company was confronted with the necessity for bridging a gully 390 feet wide and 50 feet deep at the center. The combination (p. 30) of a tonnage of scrap rails, a considerable amount of 10-inch pipe and an arc welding set provided a satisfactory bridge at low cost . . . . Successful application of bronze welding to the broken frame of a draw press saved money and avoided production delays (p. 34) in a metal fabricating plant . . . . A West Coast company has conceived the idea (p. 29) of building pickling tanks of concrete lined with an asphalt-impregnated tile. Tests have confirmed the acid-resisting qualities of the latter.

The VOICE of INDUSTRY

James A. Campbell

IF THE iron and steel industry could speak as one man, its voice would be lifted today in lament of the passing of a great steelmaker. Representing the common thought of every man in the great brotherhood of iron and steel, it would speak in fitting eulogy of a leader who served with extraordinary distinction his company, his community and his industry.

James A. Campbell was an outstanding figure in an eventful period of development in American iron and steel. Entering the industry in 1890, and retiring from it at the end of 1929, he was a leading participant in its affairs throughout four decades.

He cut his business eye-teeth in the school of bold, rugged individualism, as exemplified in the stormy nineties by men such as Andrew Carnegie, John W. Gates, Henry C. Frick, Daniel G. Reid and William H. Moore.

In the first decade of the new century, he observed the organization and early development of the United States Steel Corp., and was among the first to sense the opportunity for establishing strong independent steel producing companies. As one of the founders of the enterprise which later became the Youngstown Sheet & Tube Co., Mr. Campbell—too modest to seek a position of honor among his contemporaries—virtually was drafted into leadership in the councils of the independents. Later, his aid and counsel were sought for the benefit of the entire industry. He was a participant in the Gary dinners, and later and continuing until 1930, was an important figure in the American Iron and Steel institute.

The third decade of Mr. Campbell's service in steel brought to him the challenge of producing tonnage to help win the war. The fourth and final decade presented to him the difficult problems of postwar readjustment. It is characteristic of the man that he met both emergencies vigorously, displaying a remarkable capacity for swiftly adapting himself to changed conditions.

Perhaps that quality—adaptability—is the keynote of Mr. Campbell's success. Essentially he was an individualist, although an enlightened one. When the times called for co-operation or conciliation, none was more ready to put on the harness of harmonious teamwork

He was admired by all of his contemporaries for his sound judgment. His calm, deliberate and homely way of sizing up a situation accurately and succinctly was a delight to all who knew him intimately. But with all these qualities, Mr. Campbell was not hide-bound by tradition. Once convinced that a new idea was preferable to the old, he adopted it enthusiastically.

This quality was demonstrated on two notable occasions after the war. The first was in 1923, when his company acquired the Chicago and Milwaukee properties of the Steel & Tube Co. of America. The other was his approval of the plan for merging his company with the Bethlehem Steel Co. Both decisions must have clashed with his native loyalty to his loved Mahoning valley, yet his sense of vision told him that for future security, his company needed the broader command of markets which would be afforded by these moves.

Jim Campbell was one of a rare type of executives, who while fitting perfectly into the captain-of-industry role of the nineties, possessed the vision, courage and progressiveness necessary to enable him—35 year later—to occupy an even more commanding position under the exacting conditions of postwar adjustment.

Tower Is Institute Secretary; Ironclad Contract Adopted

REORGANIZATION of the American Iron and Steel institute to enable it to cope more effectively with conditions created by the steel code progressed last week with the election of Walter S. Tower, manager of commercial research of the Bethlehem Steel Co., as executive secretary.

Mr. Tower, whose career is sketched on page 19 of this issue, will "organize the staff of the institute and assume general and active charge of the administration of the business and affairs of the institute."

Directors at their meeting Sept. 20 also accepted the resignation of Robert P. Lamont as president. No official action was taken to fill the post of president, Charles M. Schwab continuing as chairman.

Henry A. Roemer, chairman of the board and president of the Sharon Steel Hoop Co., Sharon, Pa., was elected a director of the institute to succeed Severn P. Ker, who has resigned on account of physical disability. Mr. Roemer last week succeeded Mr. Ker as chairman of the Sharon company.

Committees in Action

D. Dewhurst, economist for the institute and formerly associated with Mr. Lamont when the latter was secretary of commerce in Washington, also has resigned. The labor committee of the institute under Frank Purnell, president of the Youngstown Sheet & Tube Co., held its first formal meeting Sept. 21. The commercial committee, of which S. E. Hackett, Jones & Laughlin Steel Corp., is chairman, met Sept. 18.

Secondary only to the new setup in the institute was the filing of an advance of $2 a ton on plates and shapes and $3 a ton on bars, effective Sept. 30 and superseding the 1.60c level on all three products announced Sept. 8.

At the close of the week merchant rail steel bars were increased $3 a ton and it was expected that alloy and cold-finished bars would also be put up to maintain their differentials.

A producer of tube rounds Sept. 22 filed a price of 1.75c, Pittsburgh, effective Oct. 2. No revisions of the iron bar price had been filed up to Sept. 22. The institute is releasing 24 new trade resolutions.

Increased costs precipitated by adherence to the steel code under the recovery act necessitated the adjustment in heavy finished steel. Originally it was estimated that application of the steel code, including the 8-hour day, would add $64,000,000 annually to steel payrolls. This estimate has now been stepped up to nearly $100,000,000 a year.

Last June an increase in heavy steel prices was considered but action was postponed in the hope that increased volume would requite producers for any increase in costs due to re-employment and increases in wage rates.

Up to the ingot, the increase in cost is believed to be $2 per ton, while added conversion costs make the total almost $4. Labor generally has been advanced 15 per cent, while salaries in the case of one important producer have been restored to 88½ per cent of the 1929 level.

The coal situation is estimated to have cost the industry several millions, one leading mill putting its coal cost in August up more than $1,000,000 as a result of the strike in western Pennsylvania.

New forms of contracts, issued last week, disclose a policy of synchronizing contracts with actual requirements. Leading producers of plates, shapes and bars are now contracting on this basis:

For definite tonnage against which specifications must be issued to permit shipment before the end of the quarter; for a tonnage which may be increased or decreased 25 per cent as conditions dictate; for a stated percentage of a consumer's requirements for any product, subject to a maximum. Also under consideration last week was a proposal to grant consumers protection on identified jobs for 60 days.

It developed last week that a number of railroads, anticipating the removal of the surcharges on Oct. 1, have filed new tariffs in which the proposed rate is the sum of the present rate plus the surcharge, thereby eliminating any potential saving to the shipper. However, freight rates on sheet bars and slabs from Cleveland to various points have been sharply reduced.

At Washington last week a code for the industrial supplies and machinery distributors trade was submitted by the National Supply and Machinery Distributors association and the Southern Supply and Machinery Distributors association. A hearing on this code begins Sept. 27 in Washington.

The malleable iron code has been set down for hearing in Washington Oct. 2. The hearing for the steel tubular and fire box boiler industry has been arranged for Sept. 28. On Sept. 29 the code of the shovel, dragline and crane industry will be heard.

The National Institute of Used Machinery and Equipment Dealers, 285 Madison avenue, New York, has called a meeting in Cleveland, Sept. 30 at Hotel Statler to consider a code for this branch of industry.

The code for the crucible industry, filed by the Crucible Manufacturers association, is to be heard in Washington Oct. 4.

Waste Materials Code Filed

A general labor code for the secondary raw materials industry has been filed with NRA at Washington in the name of the following trade associations: Institute of Scrap Iron and Steel, Wool Stock council, Sanitary Institute of America, National Scrap Metal Dealers' association, and American Paper Mill Supplies institute, representing approximately 1200 of the principal firms in the various branches of the waste materials industry.

The general labor code is a short document providing for uniform minimum wages and maximum hours of labor throughout the industry, but providing that supplementary codes may be promptly filed by any trade association truly representative of any commodity division.

The American Machine and Parts association has been formed to handle code and other economic problems for specialty manufacturers who fit into no particular industrial classification and are not aligned with any trade association already established.

William J. Kelly, president of Arthur J. O'Leary & Son Co., Chicago,

10 Hours To Read All Bids To P. R. R. Under Code

STEEL sellers figure they are in for an almost inexhaustible amount of work in figuring under the steel code provisions the requirements of the Pennsylvania railroad on which there will be Clayton Act openings, Sept. 28 and 29.

The inquiry on tubular products alone covers approximately 175 pages and would require about 2000 entries of prices to complete the schedule as presented.

It is conservatively estimated that it would take not less than 10 hours to read the bids if all the manufacturers of these products submitted prices on all items.

Complications in quoting on these and other products arise by virtue of the fact that the code requires all prices to be quoted f.o.b. points of destination. As noted in a previous issue, approximately 12,000 tons are being figured on.

has been made head of the association, which is expected to follow in general policies the lead of the Machinery and Allied Products institute, with which it will ally itself. The code for members is in preparation and will be submitted at Washington shortly. Headquarters have been established at 221 North LaSalle street, Chicago.

Philadelphia Steel Club Outing Sucess; 125 Attend

Despite decidedly inclement weather, approximately 125 attended the annual outing of the Steel Club of Philadelphia at the Aronimink golf club, near Philadelphia, Sept. 15. In addition to golf, various stunts and other forms of entertainment featured the day's program.

Frank H. Davis, vice president of the Penn Mutual Life Insurance Co., principal speaker, and W. A. Gray, prominent lawyer, both of Philadelphia, spoke at the banquet

H. O. Lange, Phoenix Iron Co., president of the club, initiated the evening's festivities and turned the proceedings over to Harry G. Uphouse, Philadelphia Steel Sales Co., who served as head of the committee on arrangements and attendance. Award of various prizes took more than an hour.

Pittsburgh Warehouse Body Adds 2 Vice Presidents

In addition to the two vice presidents and committee chairmen of the Pittsburgh chapter of the American Steel Warehouse association which were named on page 47, STEEL, Sept. 18, three additional appointments have since been made:

C. C. Hunter, Steel Products Co., Pittsburgh, chairman of the cold-finished steel bar, cold-rolled strip and flat wire group; E. O. Edmundson, Williams & Co., Pittsburgh, for mechanical and boiler tubes; and Joseph Bowman, American Steel Band Co., Pittsburgh, for primes and second sheets.

Territory of the chapter has been defined to include not only western Pennsylvania, but also all of West Virginia, two counties in Maryland and 21 southern Ohio counties.

Crucible Steel Dismantling Its Crescent Works

Crucible Steel Co. of America, New York, has begun to dismantle its Crescent works at Fifty-first street and Allegheny Valley railroad, Pittsburgh, which was built in 1865. Dismantling will not be completed before approximately the next year.

Annual rated capacity of this works had been 45,000 tons of basic open-hearth ingots and about 18,000 tons of crucible ingots, as well as alloy ingots.

Finishing capacity was rated at around 15,000 tons annually, largely in bars and a small tonnage in black sheets and cold-rolled spring steel. A large part of the capacity was turned over to forgings and hammered and rolled tool steels, of which about 10,000 tons could normally be produced in a year.

The plant's equipment includes three basic open hearths of 25-ton capacity, five crucible steel furnaces totaling 204 crucible pots, 61 heating furnaces, an 18-inch band mill and a 14, 12, 8 and two 9-inch bar mills as well as two hot sheet mills, five sheet furnaces and four box annealing furnaces. The company also listed 21 steam hammers.

Between 8000 and 9000 tons of scrap, largely cast iron, will be realized from the old works, dismantling of which is being done by the company's own forces.

Official Price Extras Available Soon

Uniform extras covering all materials produced by iron and steel companies under the code of fair competition now are being compiled by the American Iron and Steel institute for official publication at an early date. Until the official extras are released by publication of the institute's book, all price extras which have been published must be considered as tentative, and subject to correction.

As soon as the book of official extras is available, it will be issued by the institute to members of the code under conditions to be announced at the time of publication. The official extras also will be published in the seventh edition of the Standard Handbook of Price Extras, published by Steel and Daily Metal Trade, 1213 West Third Street, Cleveland. Under a special prepublication plan, Steel is offering the new seventh edition (containing the new official code extras) and the eighth edition (April, 1934) for $1.

Halt Sale of Lemoyne Co.

Sale of the property of the LeMoyne Steel Co., Monongahela, Pa., to the United Iron & Metal Co., Pittsburgh, high bidder, has been withheld pending an injunction filed by the former owners in the courts. Plant was bid at a sheriff sale recently.

The works at Monongahela, Pa., were built in 1918 and equipment includes one 2-ton Heroult electric furnace, two coal-fired heating furnaces, a 10-inch guide mill, three annealing furnaces and four steam hammers. H. A. Kuhn has been president of the LeMoyne company.

The Business Week In Washington

COLLECTORS of customs have been authorized by the treasury department to exclude from classification under paragraph 301 of the tariff act of 1930 as spiegeleisen any alloy which contains more than 1.50 per cent of silicon.

Silico spiegel, a ferrous alloy containing manganese and carbon and having a silicon content in excess of 1.50 per cent, is properly dutiable, the department has found, at the rate of 25 per cent ad valorem under paragraph 302(0) of the tariff act of 1930.

□ □ □

Treasury department has notified collectors of customs throughout the entire country that articles composed wholly of one or more kinds of iron or steel, provided for in a paragraph enumerated in paragraph 305 of the tariff act of 1930, are to be treated as entireties for the purpose of assessing both specific and ad valorem duties under paragraph 305.

In the case of articles provided for in one of the enumerated paragraphs which are composed of iron or steel and other material, the determination of the application and amount of additional duties, both specific and ad valorem, under paragraph 305, shall be without reference to the weight and value of the material other than iron or steel, when this may be separately ascertained.

□ □ □

Secretary of the Treasury Woodin has announced the finding of dumping on the American market from Germany of steel textile spindles inserts (bolsters) following an investigation and a dumping order has been issued.

□ □ □

August wholesale price index number for structural steel was 81.7, same as in July of this year and August of last year, taking 1926 as 100, according to the bureau of labor statistics.

For the iron and steel industry the August wholesale price number was 78.7 for August, 1932.

Offer Hausman Assets

Hausman & Wimmer Co.'s physical assets in scrap, switching system, cranes and other yard facilities, will be publicly auctioned at 2:00 p.m., Oct. 10, at the yard's location, Midland, Pa., by the Commonwealth Trust Co., Pittsburgh.

WINDOWS OF WASHINGTON

NRA's Best Is Not Enough

♦ ♦ ♦

Draw Govt. Steel from Hat

♦ ♦ ♦

Congress Looms as Menace

WASHINGTON

INSTEAD of proving a panacea for all industrial ills and putting some 7,000,000 persons back to work by early fall, NRA is rapidly becoming just another worry to the President.

Each succeeding week there is more frank discussion of it in Washington; the curve of critical analysis is ascending in about the same degree that the curve of effectiveness descends. No longer is it *lese majeste* to debate its merits.

As a long range proposition to rationalize competition and permit industry to put itself on a warranted, remunerative basis, the principles of NRA are regarded as tenable. But to reform industry within three months and at the same time inject sufficient impetus to lift the nation out of depression, a growing body of opinion says no.

Loaded down with so many unsound economic ideas, the blue eagle campaign has scarcely been able to take off. The boycott idea is failing, as evidenced by the purchase of 48 Fords by Detroit and five by Jefferson county, Alabama, where Rooseyelt sentiment was supposed to be supreme. The widespread distribution of blue eagle placards, from peanut stands up, is believed to have cheapened the campaign beyond redemption.

The "buy now" slogan has not been effective, if statistics of production are an accurate gage. The "spread the work" phase appears to have merely added names to payrolls without expanding the bulk of purchasing power, in the meantime discouraging the purchases of equipment which are so essential to the capital goods industries. The latter, long slighted in favor of labor, are receiving more kindly notice.

NRA will not fade out of the industrial picture precipitately, nor is it entirely lacking in accomplishment. Organized labor can be depended upon to try to bludgeon shorter hours out of industry. It was no little achievement to bring together diverse elements of industry which heretofore have resisted all attempts at approachment. Some worthy projects may proceed under the aegis of the public works administration. The elimination of child labor and the trend toward the shorter week will go down as notable advances.

But the high expectation for NRA and the basis upon which it was "sold" to the public—that it would not only equalize improvement in business but would also sweep recovery to new heights by fall and relieve the unemployment situation for the coming winter—is not being realized.

DURING the three months that have elapsed since the recovery act was signed on June 16, NRA has eclipsed all other means of recovery.

Purposely the natural forces that were accelerating recovery in the early summer were subordinated. Even the agricultural situation was relegated to the background. General Johnson and NRA were played up to the point of sending even the President into the inside pages.

Now, with the late fall approaching and the broadest claim for re-employment 2,000,000 persons, or a scant third of the objective, and the decline in steel production and the capital goods industries alarming, it can be considered that General Johnson has had his day. Other forces for recovery will be employed, and NRA becomes one act instead of the entire show.

But there is no gloating in Washington. Rather, there are many who fear that the country may better have accepted NRA in preference to what may be evolved as a substitute. And the President is being pushed into a corner by inflationists, for whom the failure of the recovery campaign on the Johnson front is ammunition.

It was with no small degree of political agility that the President persuaded congress at the special session to make his powers for inflation permissive. He succeeded with the argument that NRA would succeed so handsomely that currency inflation would be unnecessary. Credit inflation, incidentally, has been tried at all stages of the depression, even under Hoover, without results.

Currency inflation sentiment is spreading like wildfire in congress. The South, having tasted blood in being paid $100,000,000 for plowing cotton under, is now demanding that the 4.2-cent processing tax be removed. It was to this tax that the administration looked for revenue. The West, about to get a like sum for plowing under wheat, also is restive and flirting with inflation.

Reports from outside are to the effect that given a free hand, business might reverse the present ebb tide, but there is every indication that the administration believes some artificial stimulus is necessary. In congress this stimulus is universally believed to be inflation; the President may be expected to concentrate on public works, try to revive railroad buying, force banks to loosen up on credit, make another effort to raise commodity prices.

NRA having proved a disappointment from the standpoint of quick, practical results, the President may be expected to strike hard and soon on other fronts. In fact, soft-pedaling NRA may restore confidence, and fall business yet may be good.

It will be winter, too, when congress convenes, and apparently some 8,000,000 persons still will be unemployed. Congress will be mindful too, that the majority of it will be up for re-election in 1934, while the President has a respite until 1936.

There are a good many in Washington who believe that the failure of NRA will cost President Roosevelt

considerable prestige, and Republican lookouts in the capital have been picking up their ears lately. His struggle with congress will be the next big test of the President.

WHERE the blue eagle alights, if at all, is of little concern to industry, but that portion of NRA dealing with industrial codes remains a vital point.

Within a few days the outline of a new setup, primarily to deal with the administration of codes, is expected to be presented. Gen. T. S. Hammond, of the Whiting Corp., Harvey, Ill., and an aide to General Johnson, heads the group which is drafting plans.

Secretary of Commerce Roper would like to have this organization part of his department. The federal trade commission also is casting envious eyes. It being said of General Johnson that he is an organizer, not an administrator, he may not be in the picture, but he would like to see NRA remain a separate entity.

Organized labor won the chief battle of NRA when it wrote section 7a, the famous collective bargaining clause, into the recovery act. It has overlooked no opportunity to attempt to force unionization upon industry, this alone probably costing NRA the confidence it so badly required from industry.

Regardless of whether NRA fades from public view, the recovery act is on the statute book until June 16, 1935. The codes in many industries are likely to remain in force, first, because industry can get together around a table with the doors barred to the antitrust laws, and, second, labor will not willingly lay down so effective a tool.

One by one the codes already adopted will come up for review. The objective of organized labor still is a 35-hour week. Only in the soil pipe code has it closely approached this goal, winning there a 32-hour week. So any obituary of NRA from the standpoint of pressure from labor would be premature, as every time a code bobs up for revision or continuation labor has another opportunity to battle for the short week.

ORGANIZED labor, or more specifically William Green, president of the American Federation, has become strikingly aggressive the past few days.

For one reason, the annual convention of the federation opens next Monday in Washington, and the pronouncements of Mr. Green are not only a "bracer" for delegates to the convention but also by way of proof that he is active and vigorous in furthering the cause of labor. Friends of John L. Lewis, heading the United Mine Workers, might suggest him for president if occasion arises.

But apart from any personal note, the declaration of Mr. Green that "I want to make it clear . . . that the American Federation of Labor is going to organize the unorganized. It is going to continue to be . . . the recognized, all-embracing spokes man for American labor" suggests a form of monopoly which the recovery act forbids.

Employers, according to the act, must permit employes to organize unhampered, but the American Federation intends stepping in and doing the organizing!

Another statement of Mr. Green, confirming the objective of a short week in further revisions of codes, restates the position of the federation that a 35 hour week remains the minimum requirement.

WITH the blue eagle flapping wearily and public works projects still slow in developing, the prospect is the brighter that the railroads will be asked to make commitments.

Some time this week Railroad Coordinator Eastman's staff expects to submit to the President the summary of a questionnaire on the rail tonnage the carriers would place if the price were "right." Then the President will call in representatives of rail mills.

One report is that 1,000,000 tons will be placed if the price is reduced 20 to 25 per cent. This tonnage would occupy rail mills at 40 per cent of capacity for a year.

The increase of $2 to $3 per ton in fourth quarter quotations on plates, shapes and bars complicates the matter. Rails being sold on a gross ton basis, a $40 level is equivalent to 1.79c, mill.

When carbon steel was 1.60c, mill, at the time the President observed that a reduction in rails seemed desirable, there was a spread of only 19 cents per 100 pounds to cover the chemical extras and the more difficult practice in rolling rails. Now this differential has been practically wiped out.

There has been some talk that the government may order some thousands of standard freight cars of the new light-weight 50-ton design of the American Railway association, and lease them to the carriers.

The argument of the government is that new and efficient equipment would put the railroads in position to benefit promptly from any marked improvement in business. The public works administration wants to loan the necessary money, but the railroads are coy. Washington talks loosely about 2,000,000 or more tons of steel required for a railroad program.

BIDS on government steel requirements necessarily being uniform under the new steel code, the awards are becoming a matter of chance.

Excepting a slight maladjustment of fractions by one mill, all producers bidding for plates for warships to be built at navy yards submitted identical prices to the bureau of supplies and accounts, navy department, Sept. 12.

So names of all bidders on the first lot—960,000 pounds for the Boston, Philadelphia and Norfolk, Va., yards—were placed in a hat, and the representative of the Lukens Steel Co. drew his own company.

Next lot to be drawn was 640,000 pounds for the Mare Island, Calif., and Puget Sound, Wash. yards, and by a coincidence the Bethlehem Steel Co. representative drew his name.

Then lots were drawn for other specifications, with the awards as follows: 480,000 pounds for Boston, Norfolk and Philadelphia to the Jones & Laughlin Steel Corp.; 180,000 pounds for the same yards and 320,000 pounds for Mare Island and Puget Sound to the Carnegie Steel Co., and 120,000 pounds for Mare Island and Puget Sound to the Worth Steel Co.

Only the Central Iron & Steel Co. was unlucky in failing to draw any lot. Three small tonnages of plates remain to be placed.

Identical bids on 2488 tons of shapes for the same navy program were opened Sept. 19, and it is assumed that lots will also be drawn.

When the Panama canal office had lots drawn for 443 tons of plates, the United States Steel Products Co. was the winner. Jones & Laughlin, Central and Bethlehem also put in identical prices.

The coast guard, having $135,000 worth of submarine cable to place last week, decided to distribute it evenly among four bidders—American Steel & Wire Co., Simplex Wire & Cloth Co., Okonite Co., and General Cable Co.

PUBLIC hearings on NRA codes have become little more than perfunctory confirmation of decisions reached in private conferences, where most disagreements are ironed out. . . . The National Labor board, of which Senator Wagner is chairman, put up such a fight against local mediation boards, to which organized labor objected, that General Johnson was compelled to rescind his instructions that these local boards were to adjust local labor disputes. . . . Philip LaFollette, of the Wisconsin dynasty, was slated to succeed to William E. Humphrey's place on the federal trade commission. Asked by the President to resign, Commissioner Humphrey has refused. . . . Further indication that NRA has reached the "mopping up" stage is the preparation of a ban on imports threatening to undercut domestic producers whose costs have been raised by compliance with NRA. The President is empowered by the recovery act to issue a virtual embargo.

First Half Pig Iron Output Is Below 1932

Compiled by American Iron and Steel Institute

HALF-YEARLY OUTPUT OF PIG IRON AND FERRO-ALLOYS BY STATES

HALF-YEARLY PRODUCTION OF PIG IRON BY STATES*

States	Blast furnaces (a)				Production of pig iron not including ferro-alloys—Gross tons		
	In blast Dec. 31, 1932	June 30, 1933			First half of 1932	Second half of 1932	First half of 1933
		In	Out	Total			
Massachusetts	0	0	1	1	394,323	229,818	126,559
New York	1	4	15	19			
Pennsylvania	11	25	58	83	1,222,353	880,827	1,148,125
Maryland	2	3	3	6	384,310	296,464	415,104
Virginia	0	0	5	5			
West Virginia	1	3	0	3			
Kentucky	1	1	1	2			
Tennessee	0	1	3	4			
Alabama	3	7	18	25	430,402	222,496	227,378
Ohio	12	24	31	55	1,285,222	1,101,806	1,514,120
Illinois	3	7	18	25	587,485	331,795	387,818
Indiana	4	7	11	18	662,582	372,219	502,047
Michigan	2	3	5	8			
Minnesota	0	0	3	3			
Iowa	0	0	0	0			
Missouri	0	0	1	1	114,711	32,851	68,826
Colorado	0	0	3	3			
Utah	1	1	0	1			
Total	41	86	176	262	5,081,388	3,468,276	4,389,977

(a) Completed and rebuilding pig iron furnaces.

HALF-YEARLY PRODUCTION OF COKE PIG IRON BY STATES*

Massachusetts	0	0	1	1	394,323	229,818	126,559
New York	1	4	15	19			
Pennsylvania	11	25	58	83	1,222,353	880,827	1,148,125
Maryland	2	3	3	6	379,162	296,464	413,398
Virginia	0	0	5	5			
West Virginia	1	3	0	3			
Kentucky	1	1	1	2			
Tennessee	0	0	3	3			
Alabama	3	7	18	25	430,402	222,496	227,378
Ohio	12	24	31	55	1,285,222	1,101,806	1,514,120
Illinois	3	7	18	25	587,485	331,795	387,818
Indiana	4	7	11	18	652,947	371,947	497,440
Michigan	1	2	2	4			
Minnesota	0	0	3	3			
Iowa	0	0	0	0	114,711	32,851	68,826
Missouri	0	0	1	1			
Colorado	0	0	3	3			
Utah	1	1	0	1			
Total	40	84	173	257	5,066,605	3,468,004	4,383,664

HALF-YEARLY PRODUCTION OF CHARCOAL PIG IRON BY STATES*

Tennessee	0	1	0	1	14,783	272	6,313
Michigan	1	1	3	4			
Total	1	2	3	5	14,783	272	6,313

HALF-YEARLY PRODUCTION OF ALL KINDS OF FERRO-ALLOYS BY STATES†

New York	0	0	0	0	62,840	23,035	24,850
New Jersey	0	0	0	0			
Pennsylvania	3	4	7	11	48,585	36,609	52,879
Virginia	0	0	1	1	10,940	8,270	8,459
West Virginia	0	0	0	0			
Tennessee	0	1	1	2			
Alabama	0	0	0	0			
Ohio	0	0	2	2	25,886	15,624	12,720
Iowa	0	0	0	0			
Colorado	0	0	0	0			
Total	3	‡5	11	‖16	148,251	83,538	98,908

HALF-YEARLY PRODUCTION OF PIG IRON AND FERRO-ALLOYS ACCORDING TO FUEL USED

Coke pig iron	40	84	173	257	5,066,605	3,468,004	4,383,664
Charcoal pig iron	1	2	3	5	14,783	272	6,313
Total pig iron	41	86	176	262	5,081,388	3,468,276	4,389,977
Total ferro-alloys	3	5	11	16	†148,251	†83,538	†98,908
Grand total	44	91	187	278	5,229,639	3,551,814	4,488,885

*Does not include the production of ferro-manganese, spiegeleisen, ferro-silicon, or other ferro-alloys.

†Includes ferro-manganese, spiegeleisen, ferro-silicon, and other ferro-alloys made in blast furnaces or in electric furnaces.

‡During the first half of 1933 there were 7 blast furnaces which made ferro-alloys only or ferro-alloys and pig iron.

‖Blast furnaces only; electric furnaces not included.

HALF-YEARLY OUTPUT OF PIG IRON BY GRADES AND FERRO-ALLOYS BY KINDS

HALF-YEARLY PRODUCTION OF BASIC PIG IRON, GROSS TONS

States	First half of 1932	Second half of 1932	First half of 1933
New York	185,426	142,146	111,276
Pennsylvania—Allegheny County	422,276	337,097	376,735
" —Other counties	420,693	363,701	331,309
Maryland, West Va., Kentucky, Alabama	510,840	305,278	448,970
Ohio	627,828	431,551	723,734
Indiana, Illinois	722,178	332,098	450,973
Michigan, Colorado, Utah	214,764	58,551	139,005
Total	3,104,005	1,970,422	2,582,002

HALF-YEARLY PRODUCTION OF BESSEMER AND LOW-PHOSPHORUS PIG IRON, GROSS TONS

Pennsylvania	335,873	149,808	325,751
New York, Maryland, West Virginia, Alabama	108,990	73,227	100,885
Ohio	600,135	522,795	673,236
Indiana, Illinois, Michigan	233,345	196,295	250,518
Total	1,278,343	942,125	1,350,390
Including low-phosphorus pig iron	78,476	3,219	.....

HALF-YEARLY PRODUCTION OF FOUNDRY PIG IRON, GROSS TONS

New York	119,903	35,485	102,830
Pennsylvania	42,002	29,853	
Kentucky, Tennessee	206,837	242,393	123,327
Alabama			
Ohio			
Indiana, Illinois	60,432	47,489	28,602
Michigan, Colorado, Utah	22,791	4,299	
Total	451,965	359,519	254,759

HALF-YEARLY PRODUCTION OF MALLEABLE PIG IRON, GROSS TONS

New York	68,980	34,470	15,065
Pennsylvania			
Ohio	55,747	58,718	90,580
Indiana, Illinois	107,421	94,387	85,269
Total	232,148	187,575	190,914

HALF-YEARLY PRODUCTION OF FERRO-ALLOYS BY KINDS, GROSS TONS

Ferro-manganese and spiegeleisen	55,314	38,330	50,648
Ferro-silicon	86,220	38,488	34,816
Ferro-phos. and all other ferro-alloys	6,717	6,720	13,444
Total	148,251	83,538	98,908

PIG IRON AND FERRO-ALLOYS MADE FOR SALE OR FOR USE OF MAKERS IN THE FIRST SIX MONTHS OF 1933, GROSS TONS

Pig iron and ferro-alloys	For sale	For maker's use	Total
Pig iron:			
Basic	79,103	2,502,899	2,582,002
Bessemer and low-phosphorus	45,541	1,304,849	1,350,390
Foundry	243,817	10,942	254,759
Malleable	155,661	35,253	190,914
Forge or mill	887	.....	887
White and mottled, direct castings, etc.	4,475	6,550	11,025
Total pig iron	529,484	3,860,493	4,389,977
Ferro-alloys:			
Ferro-manganese and spiegeleisen	31,376	19,272	50,648
Ferro-silicon	34,816	.....	34,816
All other ferro-alloys	13,444	.....	13,444
Total ferro-alloys	79,636	19,272	98,908
Total pig iron and ferro-alloys	609,120	3,879,765	4,488,885

Steel Rate Off Point to 40%; Industry Now at May Level

THE decline in steel production was held to 1 point in the week ended Sept. 23 when Chicago mills pushed up 4 points to 44 per cent, due to rail releases, Youngstown advanced 2 points to 48 per cent and Buffalo 3 points to 48 per cent. The national average was 40 per cent.

Detroit, eastern Pennsylvania and Birmingham mills also contributed strength by remaining unchanged at 55, 35½ and 50 per cent respectively.

Wheeling operations eased off 3 points to 72 per cent, Cleveland 6 to 54 and Pittsburgh 1 to 34.

This week, Pittsburgh mills will decline 4 points more, New England will be off 16, but Youngstown will push up 2 points to 50 per cent.

Details of last week's operations follow:

Cleveland

Steelworks operations in the Cleveland-Lorain district averaged 54 per cent for the week ended Sept. 23, down 6 points from the preceding week. Corrigan, McKinney Steel Co. continued with six open hearths, and Otis Steel Co. with seven. National Tube Co., Lorain, dropped two units, operating eight. Blast furnace operations at Lorain also have been reduced, only one stack operating, and two banked.

Chicago

Steelmaking schedules rose 4 points the past week to 44 per cent, the first upturn since operations commenced a consistent decline late in July. Production has been stimulated by heavier rail orders and by pressure for shipmnts against expiring contracts. Blast furnace operations are higher, with one more furnace in blast, giving the district 7 active stacks out of 36.

Pittsburgh

Steel ingot operations declined 1 point last week to 34 per cent, but this week a drop of 4 points to 30 per cent is scheduled to take place. Orders for finished steel products still do not present an accurate gage of operations, the latter being on a higher level than incoming orders. With mills eating into their unfilled tonnages and little new coming in, the decline in mill operating rates does not yet appear to be checked.

Three steelworks blast furnaces were taken off the active list here last week. Jones & Laughlin Steel Corp. banked one Aliquippa and one South Side stack, leaving 4 out of 11 on. Carnegie Steel Co. blew one Isabella stack out for repairs. Pittsburgh Crucible Steel Co., Pittsburgh Steel Co., National Tube Co. at Monongahela, Pa., and American Steel & Wire Co. at Donora, Pa., continue to operate one each. Carnegie Steel Co. now is operating 9 out of 32 blast furnaces. In the entire district, 17 out of 53 steelworks furnaces are blowing.

Youngstown

Steel output here last week gained 2 points to 48 per cent, and was expected to advance to 50 per cent this week on further small gains in orders. Forty-six out of 83 open hearths were melting, against 40 in the week beginning Sept. 4.

Eastern Pennsylvania

Steelmaking operations here were unchanged at 35 to 36 per cent last week. With many believing the bulk of fourth quarter buying of plates, shapes and bars will be done before Sept. 30, when advances become effective, it appears that operations will tend upward.

Buffalo

A rise of 3 points last week put steel operations up to 48 per cent, and the prospect is that this rate will hold for this week. Unfilled orders of the mills, however, are light and curtailment may be ordered any day.

Wheeling

Steel ingot production in this district was off 3 points last week to 72 per cent, as against 75 per cent the week previous. Twenty-four out of 37 open hearths operated through the week.

New England

Steelmaking operations for this district were at 86 per cent for the week ended Sept. 23, but are expected to decline to 70 this week. One works is holding at 100 per cent, a second is taking off a small open hearth for repairs, and a third is taking off more than half its capacity.

Birmingham

Steelmaking operations in the Birmingham district, including Fairfield and Gadsden, are unchanged at 50 per cent.

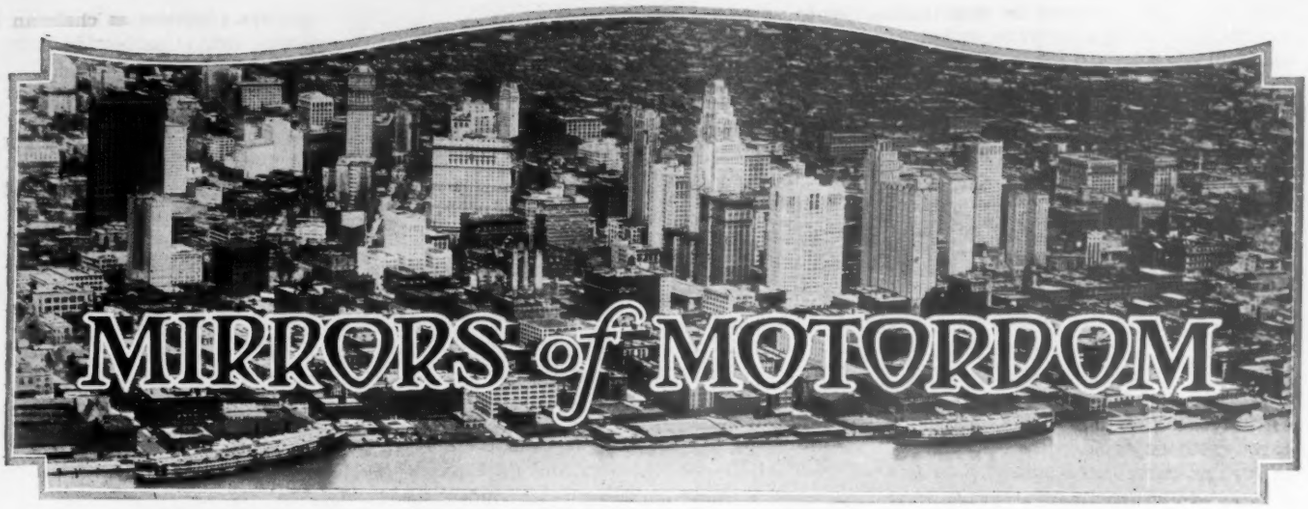
Operating Rate of the Steel Industry, by Weeks

All figures except monthly open-hearth and bessemer totals of American Iron and Steel institute are percentages, based on reports from Pittsburgh, Chicago, Youngstown, eastern Pennsylvania, Cleveland, Birmingham, Buffalo, Wheeling, New England, St. Louis, Lorain, Detroit districts. Weeks end Saturday. STEEL's weekly estimates take into account only actual available capacity, which is less than Institute's total.

1932	1st Week	2nd Week	3rd Week	4th Week	5th Week	STEEL's Average	Institute's Monthly Total tons	Institute's Monthly Average
Jan.....	22	25	26	27	28.5	25.7	1,484,991	26.41
Feb.....	28.5	27	25	25	....	26.4	1,481,253	27.40
March....	25	25.5	24.5	23	....	24.5	1,433,337	24.55
April.....	23	22	22	23	24	22.8	1,259,629	22.40
May.....	24	24	25.5	23	....	24.1	1,125,243	20.01
June.....	21	17	17	17	....	18.0	912,757	16.23
July.....	14.5	12	15.5	16.5	16.5	15.0	806,722	14.92
Aug.....	14.5	14.5	15.5	14.5	....	14.7	846,730	14.50
Sept.....	13.5	15.5	15	17	....	15.3	991,858	17.64
Oct.....	18	19	19.5	19.5	19.5	19.1	1,087,058	19.33
Nov.....	21	21	19	17.5	....	19.6	1,032,221	18.36
Dec.....	16	15	14	12	13	14.0	861,034	15.31
1933								
Jan.....	15.5	17	18	19	....	17.4	1,030,075	18.23
Feb.....	19	19	19	17	....	18.5	1,086,867	20.83
March....	15	13.5	15	14	15.5	14.6	909,886	15.50
April.....	17.5	20.5	25	29	....	23.0	1,362,856	25.08
May.....	33	36	40	43	....	38.0	2,001,991	34.11
June.....	47	48	49	51	54	49.8	2,597,517	45.96
July.....	55	57	57	55	....	55.8	3,203,810	58.95
August....	54	54	51	48	45	50.6	2,900,611	49.42
Sept.....	42	41	40	..	....	....	.....	.....

Imports Down in August

August iron and steel imports totaled 46,839 tons, compared with 52,805 in July. This makes total imports for eight months 252,122 tons, or 958 more than in the comparable period of last year. Classifications showing a decline in August included scrap, ferromanganese and rails. More hoops were brought in.



Low-Price Cars Entrenched?

• • •

Slow on Mechanical Changes

• • •

Work On Over-Drive Axle

DETROIT

ASSUMING that the country recovers to a moderate state of prosperity next year and that the automobile industry realizes its expectation of participating generously in it, will the low-price cars retain their commanding lead of the market?

Majority opinion in Detroit is that they will, but the dominant manufacturers in this bracket are taking no chances. The prospect that 1934 may be a test year is exerting a strong, and usually sobering, influence on their forthcoming model changes.

It is making them exceedingly cautious in adopting mechanical changes, for fear that one false move may ruin their reputation for reliability and economy. It is inducing further smartness in body design and accelerating the trend toward streamlining, within limits.

Popular opinion is right in believing that persons who have been buying the low price cars during the depression are those who have descended from the medium and high-price levels. It is a fair question to ask whether these buyers, on regaining some semblance of their former financial position, will return to high levels.

But popular opinion is wrong in deducing that the low-price car is the product of the depression. The fact is, the ratio of what might today be considered the leading makers in this field—Ford, Chevrolet and Plymouth—is little changed from banner 1929.

In 1929 Ford registered 1,310,147 passenger cars, Chevrolet 780,014 and Plymouth 84,969—a total of 2,185,130 out of a grand total of 3,880,247 passenger cars of all makes. These three accounted for 56.3 per cent. In those days Willys and Essex also were large sellers, and to include them is to push the low-price car percentage of 1929 business up to about 64.1 per cent.

As the accompanying table for the depression period, from 1930 to date, shows, the proportion of these three leading makers has varied remarkably little since 1929. In 1930 their proportion of all passenger car business was 66.2 per cent, in each of 1931 and 1932 it was 63.2, and in the first seven months of 1933 it was 68.2.

The enterprise and aggressiveness of Plymouth are largely responsible for this increase in 1933. Willys and Essex sales have been so small, in relation to the "big three," that their omission from 1930 on does not lower the percentage more than a point or so.

AS TO former medium and high-price car buyers returning to their old stations, the automobile market has experienced so complete an overturn since 1929 that no general rule can be laid down.

Many of the oldtime high-price buyers have been completely eliminated by the depression, and they have been permanently relocated in the low-price field.

A number of medium-price customers of pre-depression days will snap back to that field as rapidly as possible. Regardless of the merit of low-price cars, they prefer something larger and more showy.

On the other hand, with hard-surfaced highways so common and low-price cars offering such values in speed and comfort, there are thousands of enforced converts who will never go up in the price scale.

A further factor is the rising generation, which perforce to this time has had to be content with low-price cars; any increase in its purchasing power is going to lift it a notch in its automobiles.

It is not entirely due to chance that between 60 and 70 per cent of all passenger cars are sold by three makers. Compare the progress of Chevrolet, Ford and Plymouth from 1929 forward with that of medium and high-price jobs, and the balance is strongly in their favor. Volume has also enabled them to conduct more vigorous selling campaigns.

On the eve of what may be the broadest retail market since 1929 it is noteworthy that economy is the chief talking point of Ford and Chevrolet. A high official of Chevrolet states squarely that economy of operation is more vital to an owner than the initial cost.

ONE reaction of low-price popularity is to make the medium-price makers more daring in both body and mechanical changes. They

How "Big Three" in Low-Price Field Dominate

PASSENGER CARS ONLY

	Chevrolet	Ford	Plymouth	All Mfrs.
Registered in 1930	618,884	1,055,097	64,301	2,625,979
Percentage in 1930	23.6	40.2	2.4	.....
Registered in 1931	583,429	528,581	94,289	1,908,141
Percentage in 1931	30.6	27.7	4.9	.....
Registered in 1932	322,860	258,927	111,926	1,096,399
Percentage in 1932	29.4	23.6	10.2	.....
Registered in first 7 months of 1933	289,830	170,282	131,469	868,027
Percentage in 1933	33.4	19.6	15.2	.....
Total, Jan. 1, 1930, to Aug. 1, 1933	1,815,003	2,012,887	401,985	6,498,546
Percentage during this period	27.9	30.8	6.2	.....

must be more spectacular to attract attention, and because of their lower volume they can afford to take chances that high production forbids.

For example, practically all manufacturers are experimenting with automatic gear-shifts which eliminate the gear shift lever. One low-price manufacturer believes it has perfected a design but is unlikely to bring it out this year.

Were a "bug" to develop after it had been in production several months, several hundred thousand cars would have to be recalled to service stations to correct it. But the manufacturer whose entire year's output is under 10,000 units is not faced with so serious a problem. He is just as careful, of course, but the risk is not so great.

One mechanical device with which many producers are intrigued is the dual rear axle drive or what is more commonly referred to by engineers as an over-drive rear axle. In substance, it is the device brought out last year by Auburn, permitting a higher driving ratio by the mere thrust of a lever. The effect is to add a fourth speed. Several parts manufacturers are campaigning hard for the adoption of their system on 1934 models.

Ford engineers, incidentally, are experimenting with galvanizing or tinning spring leaves in order to eliminate squeaking on days when heat thins out the oil.

Ford continues to "sit tight" in regard to NRA. He has reduced hours to conform to the code, and by now has put on the promised 5000 war veterans. There are some who look for Ford to do something spectacular—perhaps reduce the price of his car radically.

AUGUST production of automobiles was expected to come close to equaling July; official statistics now show that it exceeded it.

August assemblies totaling 236,480 cars and trucks compared with 233,088 in July. The peak of 1933 thus far is June, with 253,322 units. In August, 1932, output was only 90,325.

In eight months of 1933, car and truck production in the United States totals 1,476,678 units. In all 1932 the industry turned out only 1,370,678. September is rated at practically 200,000, and barring an unexpected letdown in the last quarter, 1933 will be a 2,000,000 year, easily.

A. F. A. to Philadelphia

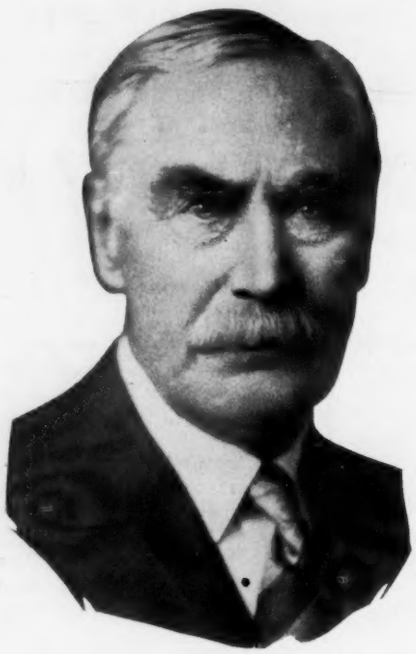
American Foundrymen's association will hold its 1934 convention and exhibition in Philadelphia, Oct. 22-26. A convention without an exhibition will be arranged for 1935. The fifth international foundry congress and exposition will be held in conjunction with A.F.A. convention and exhibition a year from October.

Died:

JAMES A. CAMPBELL, 79, chairman emeritus, Youngstown Sheet & Tube Co., Sept. 20.

A sudden heart attack killed Mr. Campbell, who for several decades was an outstanding figure in the iron and steel industry, at his home not far from Ohlton, Trumbull county, O., where he was born, Sept. 11, 1854. He celebrated his birthday two weeks ago.

Son of a farmer, and in his youth a coal clerk, Mr. Campbell rose to the pinnacle of his career through determination, untiring industry, and unusual foresight. His first connection with the Mahoning valley and its iron and steel industry was in 1890, when



James A. Campbell

he was appointed superintendent of the Trumbull Iron Co., Warren, O.

In succession he was identified with the Union Iron & Steel Co., Pomeroy, O., Mahoning Valley Iron Co., Youngstown, O., and a district manager for six plants of the Republic Iron & Steel Co., Youngstown, O.

Mr. Campbell was one of the founders of the Youngstown Iron Sheet & Tube Co., predecessor of the Youngstown Sheet & Tube Co., organized in 1901, and was its vice president and general manager. June 26, 1904, he was elected president. Under his direction the company expanded until it became the third largest steel producer in this country.

He was elected chairman of the board of the Sheet & Tube company in December, 1929, when he was succeeded to the presidency by Frank Purnell, who for four years had been assistant president. In February, 1932, he was named chairman emeritus, and was succeeded as chairman by Henry G. Dalton, now senior partner in Pickands, Mather & Co.

Mr. Campbell had been a director of the American Iron & Steel Co., Mahoning Ore & Steel Co., Crete Mining Co., Balkan Mining Co., Carbon Limestone Co., and of several banks and other commercial enterprises in Youngstown. He was an honorary vice president of the American Iron and Steel Institute.

(*An appreciation of James A. Campbell appears on page* 10.)

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Clement E. Chase, 45, bridge engineer, at Philadelphia, Sept. 18. He fell 120 feet from a bridge he helped to design. He was a member of Modjeski, Masters & Chase, New York.

□ □ □

Loring G. Robbins, 54, treasurer, Robbins, Gamwell & Co., manufacturers of plumbing and steam fitting supplies, in Pittsfield, Mass., Sept. 13. He was graduated from Cornell in 1900.

□ □ □

John S. Barnes, 52, president, W. F. & John Barnes Co., machine tool manufacturer, Rockford, Ill., and chairman of the board of trustees of Rockford college, Sept. 19, at his home in that city.

□ □ □

Irwin C. Sutphen, 51, manager of the New York branch of Armco International, in Middletown, O., Sept. 19. He was a native of Middletown, headquarters of the American Rolling Mill Co., and became ill there while on vacation.

□ □ □

Niels L. Mortensen, 48, general works manager, Cutler-Hammer Inc., in Milwaukee, Sept. 12. He was born in Denmark and came to America in 1905, joining the Milwaukee industry in a minor engineering capacity. He was a fellow of the American Institute of Electrical Engineers.

□ □ □

William Brown, long associated with the various steel companies in this country and in Spain, in Houston, Tex., Sept. 12. He was born in Scotland and came to this country in 1887.

□ □ □

Harry G. Weymouth, 53, retired manufacturer and inventor, in Cleveland, Sept. 17. He was general manager of the Eaton Axle Co., Cleveland, before he joined the Pittsburgh Meter Co., Pittsburgh, where he patented many meters.

□ □ □

Frederick M. Devlin, 57, prominent Philadelphia foundryman, in that city, recently. He was president of the Philadelphia Hardware & Malleable Iron Works, and former president of the Philadelphia Foundrymen's association, having been elected to that office in 1922 to fill the unexpired term of his father.

Industrial Men in the Day's News

Walter S. Tower, Executive Secretary, American Iron and Steel Institute

SEASONED experience as a trade economist will aid him in conducting Iron and Steel institute's affairs.

TRADE expert with the shipping board in war time, he also was adviser to commission to negotiate peace.

HE has been manager of commercial research for Bethlehem Steel Co. since his return in 1924 from American embassy in London.

WALTER SHELDON TOWER, who was elected secretary of the American Iron and Steel institute at a meeting of the board of directors in New York, Sept. 20, has been manager of commercial research for the Bethlehem Steel Co. In his new position Mr. Tower will organize the institute staff and will have charge in administering the institute's affairs.

Mr. Tower, to whom now falls the important task of maintaining contact with the recovery administration, was born in West Bridgewater, Mass., July 26, 1881. He was graduated with an A. B. degree from Harvard in 1903, received an A. M. degree there in 1904, and a degree of Ph.D. from the University of Pennsylvania in 1906.

Following his graduation, Mr. Tower taught economics, and subsequently adopted a business career. He was trade expert to the United States Shipping board, 1918-1919; and was with the American Commission to Negotiate Peace, in Paris, 1919.

In 1919 he became trade adviser to the Consolidated Steel Corp., New York, which position he held through 1921. He was commercial attache to the American embassy, London, October, 1921, to November, 1924, since which time he has been with the Bethlehem company.

HENRY A. ROEMER has been elected chairman, Sharon Steel Hoop Co., Sharon, Pa., succeeding Severn P. Ker, who resigned as noted in STEEL Sept. 11. Mr. Roemer will retain the office of president. He resigned the presidency of the Continental Steel Corp., Kokomo, Ind., in December, 1929, to become president of the Sharon company, in which office he succeeded Mr. Ker, who resigned after 21 years' service as president to become chairman.

Mr. Roemer has been identified with the iron and steel industry since he was 14 years old. Through various positions at Struthers, O., he advanced to the superintendency of the American Sheet & Tin Plate Co.'s Struthers mill. In 1907 he went to the Youngstown Sheet & Tube Co.'s Campbell plant; in 1913 he became superintendent, Canton Sheet Steel Co., Canton, O.; then vice president and general manager, and later president, Superior Sheet Steel Co., Canton, O. In 1927, when the Superior company and others were merged into the Continental corporation, he was elected president.

□ □ □

Harry C. Brown, who has been vice president of the Newhall Chain Forge & Iron Co., New York, has been elected president, filling the vacancy caused by the recent death of Henry B. Newhall. Mr. Brown has been associated with the company for 34 years, having been vice president in charge of manufacture and sales since 1909.

The Newhall company will again operate as an independent organization, as it did up to seven years ago. The New York offices and warehouses will remain at 48 West Broadway, and the chain and forging works at Rennselaer, N. Y., will continue to operate.

□ □ □

Emmett K. Conneely has been appointed manager of railroad sales by the Republic Steel Corp., with headquarters in Youngstown, O. Mr. Conneely served in various capacities with the Pittsburgh & Lake Erie railroad, and joined the Standard Steel Car Co. during the World war. He was later associated with the New York Air Brake Co. as vice president, and became vice president of the Pullman Co., at New York upon that company's acquisition of the Standard company. He subsequently was made vice president of the Standard company at Chicago.

□ □ □

Oscar Vogl, recently general merchandising director of the Pabst Corp., Milwaukee, has been named general sales manager of the barrel division of Ingersoll Steel & Disc Co., division of the Borg Warner Corp., Chicago. Mr. Vogl will specialize in the promotion of Krupp designed beer barrels, stainless steel and stainless clad steel tanks and other equipment for breweries. Mr. Vogl has had a broad background in European as well as

(*Please turn to Page* 94)

EDITORIAL

Revamp Recovery Plans To Aid Forgotten Industries!

NOW that NRA is passing from the emotional stage into the period of actual application, disillusionment is sweeping the nation. Blind hope and enthusiasm are giving way to critical appraisal. The reality of actual experience under the provisions of NRA is exerting a sobering influence, which should help us to avoid pitfalls in the path to ultimate recovery.

It is too early to evaluate the national recovery program. However, it has developed far enough to indicate certain defects. The greatest mistake was that of press-agenting NRA so lavishly that the majority of the populace—particularly wage earners, consumers and small merchants—were given an exaggerated idea of what it would accomplish. The discrepancies between the advertised benefits and the actual accomplishments are so pronounced that public confidence may be seriously impaired.

A second mistake of major importance was the failure of the administration to take into account the importance of the capital goods industries. As pointed out in last week's issue, this was due in part to resentment among the social-minded in Washington against "labor-saving" machinery and to the feeling of some administrators that the increase of purchasing by employes in the consumer goods industries eventually would react to the benefit of the manufacturers of durable goods.

Potentialities of Big Reservoir of Jobs Virtually Ignored in Recovery Plan

Now it is clear that the neglect of the building, machinery and equipment industries was unfortunate in several respects. For instance, the output of this group in 1929 was valued at $40,000,000,000, as compared with $30,000,000,000 for all the products of the consumer goods industries. Normally the capital goods group employs about 8,000,000 workers, yet in planning for re-employment under NRA, the administration virtually ignored the opportunity for increasing the number of jobs in this great potential reservoir of employment.

That the deficiency of employment is greater in the building, machinery and equipment industries than in the consumer goods field is indicated by comparisons of activity in 1933 with that of the 10-year average, for the years 1922 to 1931, inclusive.

The following table shows the monthly averages for a few important items of construction and equipment. The percentage of decline from the 10-year average, ranging from 45 to 98 per cent, is typical of the sharp contraction suffered in hundreds of products which go into the "plant and equipment" of the nation.

	Monthly average, 10 years (1922-31)	Monthly average, 7 months 1933	Per cent of decline from 10-yr. ave.
Railroad track work, tons....	12,700	2,100	84.6
Railroad car awards, units	7,000	124	98.2
Shipbuilding, gross tons.....	22,590	12,416	45.0
Building construction, 1000 sq. ft.	63,160	11,442	81.8
Machine tool orders, index No.	147	28	80.1
Foundry equipment orders, index No.	125	33	73.4
Electric overhead cranes, orders	$728,000	$55,000	92.4
Steel boilers, units	1,275	305	76.8

Compare the foregoing examples of almost extinction of business activity with the following, which shows comparable figures for retail trade, which is a fair index of the consumption of consumers goods:

	Monthly average, 10 years (1922-31)	Monthly average, 7 months 1933	Per cent of decline from 10-yr. ave.
Department store sales, index No.	101	57	43.5
5 and 10c. chain store sales, index No.	127	116	8.6
Mail order sales, $1000.....	$41,359	$32,740	20.8
Postal receipts in 50 selected cities, $1000.....	$28,716	24,091	16.1

These comparisons show that roughly, the demand for consumers' goods has dropped about 25 per cent from the 10-year average, while the demand for durable goods has declined about 75 per cent.

The inevitable conclusion is that the administration, in its future planning for NRA, RFC, railroad co-ordination, PWA and all other recovery agencies, should place more emphasis upon stimulating the recovery of the construction and equipment industries.

This means erasing the stigma which has been placed upon machines by irresponsible Washington spokesmen; removing the threat of state operation of utilities, which prevents utility companies from spending for rehabilitation; and establishing a monetary policy which will encourage private investment of capital.

THE INDUSTRIAL DIAL

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The Business Trend Section of STEEL
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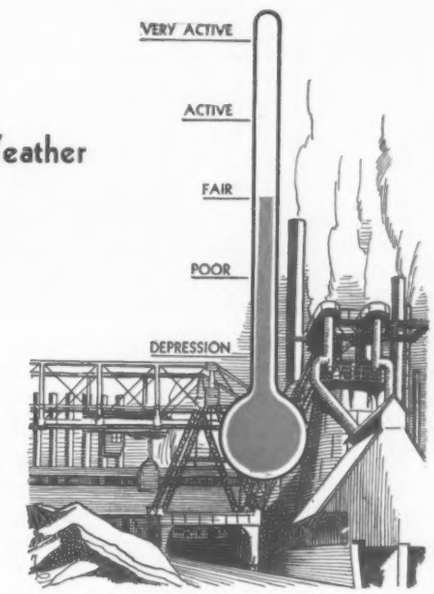
SEPTEMBER has been a month of vexing postponements. Throughout the early summer, business executives agreed in the belief that by Labor day, or soon thereafter, many uncertainties would be cleared up and that a definite trend in industrial activity would be discernible. The end of the month is near, and, at this writing, business still is so spotty that the direction of its trend is in doubt.

Hope that a seasonable upturn will develop in the early fall has not yet been abandoned. In fact the latest current reports are faintly encouraging. The decline in the rate of steelworks operations, which has continued steadily since the third week of July, has been interrupted. It seems likely that the rate for the week ending Sept. 23 will hold at the level of the previous week or advance slightly (see page 16 for final figures). Electric power output in the week ending Sept. 16 rose to the highest point in two years. Railroad freight car loadings rebounded sharply after the Labor day interruption, but the trend for September will not be definitely established until the record for the third week is known.

Modest improvement in equipment orders was reflected in the index numbers for August. Machine tool orders have increased steadily, although moderately, since April. The index for August, as compiled by the National Machine Tool Builders' association, stood at 57.4 as compared with 53.9 in July. Foundry equipment orders, which likewise have registered gains in every month since March, rose rather sharply in August. The index number for that month

Industrial Weather

TREND:
Uncertain



was 56.3, as against 48.8 in July, according to Foundry Equipment Manufacturers' association.

The price situation, which has been erratic during the summer, seems to be pointing toward a more clearly defined trend. Prof. Irving Fisher's index touched 71.1, a new high for the recovery period, in the week of Sept. 15.

The outlook for business still is clouded by the uncertain influences of artificial factors. NRA unquestionably has slowed activity in some lines. Here and there it has stimulated orders. It is too early to determine its net hindrance or assistance to business.

Business services and professional forecasters

The Barometer of Business

Industrial Indicators

	Aug., 1933	July, 1933	Aug., 1932
Pig iron output (Daily average, tons)	59,137	58,108	17,035
Machine Tool Index	50.4	40.4	30.3
Unfilled orders (tons)	1,890,444	2,020,125	1,969,595
Ingot output (Daily average, tons)	107,430	128,152	31,360
Dodge Bldg. awards in 37 states (sq. ft.)	.....	14,605,600	13,843,500
Automobile output	*220,000	239,628	94,391
Coal output, tons	33,852,000	29,482,000	22,489,000
Business failures, number	1,472	1,421	2,796
Business failures, liabilities	$42,776,000	$27,481,103	$77,031,212
Cement production, Bbls.	.....	8,609,000	7,835,000
Cotton consumption bales	588,570	600,143	402,601
Car loadings (weekly average)	625,679	621,763	586,225

*Estimate.

Foreign Trade

	Aug., 1933	July, 1933	Aug., 1932
Exports	.....	$144,197,334	$108,599,000
Imports	.....	$142,991,658	$91,102,000
Gold exports	.....	$85,375,000	$18,067,000
Gold imports	.....	$1,496,000	$24,170,000

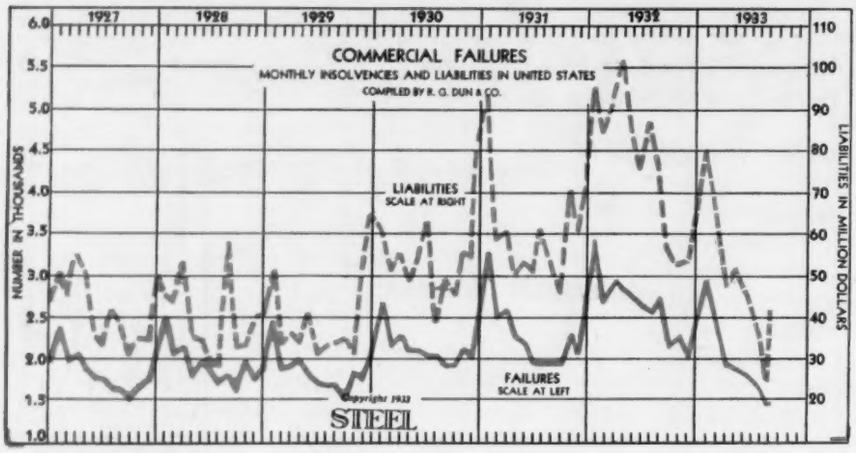
Financial Indicators

	Aug., 1933	July, 1933	Aug., 1932
25 Industrial stocks	$135.86	$135.84	$103.32
25 Rail stocks	$40.63	$41.09	$29.46
40 Bonds	$77.18	$77.53	$71.23
Bank clearings (000 omitted)	$16,408,656	$21,428,987	$19,797,496
Commercial paper rate N. Y., per cent	1¾	1¾	2½
*Commercial loans (000 omitted)	$8,533,000	$4,772,000	$6,280,000
Federal Reserve ratio, per cent	67.5	68.5	58.9
**Railroad earnings	$64,309,929	$59,483,185	$11,287,720
Stock sales, N. Y. stock exchange	42,466,352	120,300,463	82,649,154
Bond sales, par value	$216,100,700	$384,014,300	$344,494,950

*Leading member banks Federal Reserve System.
**July, June and July respectively.

Commodity Prices

	Aug., 1933	July, 1933	Aug., 1932	Monthly Av. 1913
STEEL'S composite average of 14 iron and steel prices	$30.04	$29.81	$29.32	$26.32
Bradstreet's index	$8.99	$9.00	$7.17	100
Wheat, cash (bushel)	$1.07	$1.18	68c	92c
Corn, cash (bushel)	66c	73c	47c	51c
Petroleum Crude (Bbl.)	87c	90c	$2.50	.....



Number

August, 1933	1,472
July, 1933	1,421
August, 1932	2,796

Liabilities

August, 1933	$42,776,049
July, 1933	27,481,103
August, 1932	77,031,212

are almost unanimous in predicting a fall upturn in industrial activity. Some think the upswing will not be noticeable until mid-October. On the other hand, many industrialists are decidedly pessimistic over the prospect for the remainder of the year. It is possible that part of this gloom is engendered by fear of what may happen under NRA, rather than by that which actually has happened.

While no one underrates the influence of NRA, the fact remains that NRA is passing into the stage of practical application, where it will face the acid test of experience. Meantime inflation, or broader monetary policies, probably will assume first rank among the leading problems of the nation. Possibly business will find that in the final quarter, its interests will be affected more by the government's decisions on money than by the influence of NRA.

Where Business Stands

Monthly Average, 1932 — 100

	Aug., 1933	July, 1933	Aug., 1932
Steel Ingot Output	255.9	305.3	74.7
Pig Iron Output	249.5	245.2	71.8
Freight Movement	115.2	114.4	108.0
Building Construction	.....	107.7	106.6
Automobile Output	184.4	200.9	79.1
Wholesale Prices	126.6	126.8	101.0

August Business Failures Lowest Since 1925; Liabilities Gain

Business failures in the United States during August were again greatly reduced in number. According to Dun & Bradstreet Inc., there were 1472 insolvencies during August, that number being less than for any August back to 1925. In August a year ago there were 2796 defaults which was the highest for that month on record. Owing to the number of large defaults, liabilities in August at $42,776,049 were considerably above the July indebtedness of $27,481,103.

Commodity Price Trend Levels Off After Five Monthly Advances

Bradstreet's index of commodity prices, after five monthly advances since the low record of March 1, remained virtually unchanged on Sept. 1. The index stood at $8.9918 compared with $9.0095 on Aug. 1, a decline of only two-tenths of 1 per cent. This compares with a rise of 8.1 per cent from July to Aug. 1 and 3.9 per cent from June 1 to July 1. The index for Sept. 1, a year ago, stood at $7.1724.

	1933	1932
September 1	$8.99	$7.17
August 1	9.00	6.95
July 1	8.33	6.68
June 1	8.02	6.92
May 1	6.98	7.15

Fig. 1—Recently perfected intermediate alloy steel containing manganese, chromium and vanadium, is specially suited to the manufacturing requirements of crankshafts, camshafts and other parts involved in the construction of automobiles

DEVELOPS MANGANESE-CHROME-VANADIUM STEEL FOR AUTOMOTIVE FORGINGS

BY H. T. CHANDLER and C. N. DAWE

THE modern automobile is what it is, largely, as a result of progress in steelmaking. Almost every unit of automotive construction—the engine, transmission, spring suspension, rear axle, and the like—presents problems of design, manufacture, or adequate service life best answered by use of highly-specialized steels. The steelmaker, by means of the ferroalloys of vanadium, nickel, molybdenum, chromium, tungsten, manganese, silicon, etc., has developed these materials in a remarkably short time, and the automotive engineer now has at his disposal a wide range of steel products embracing almost any degree of tensile strength, hardness, toughness, heat and wear resistance or other physical properties required.

Thus, we have spring steels which will absorb and dissipate shocks of the road without fatigue; valve materials to resist high temperature; gear steels of great strength, toughness, and wear resistance that permit compact lightweight transmission and axle constructions; steels suitable for carburizing or nitriding which are treated to give a hard surface and tough core; and many other special steels possessing particular combinations of physical properties required to withstand the destructive

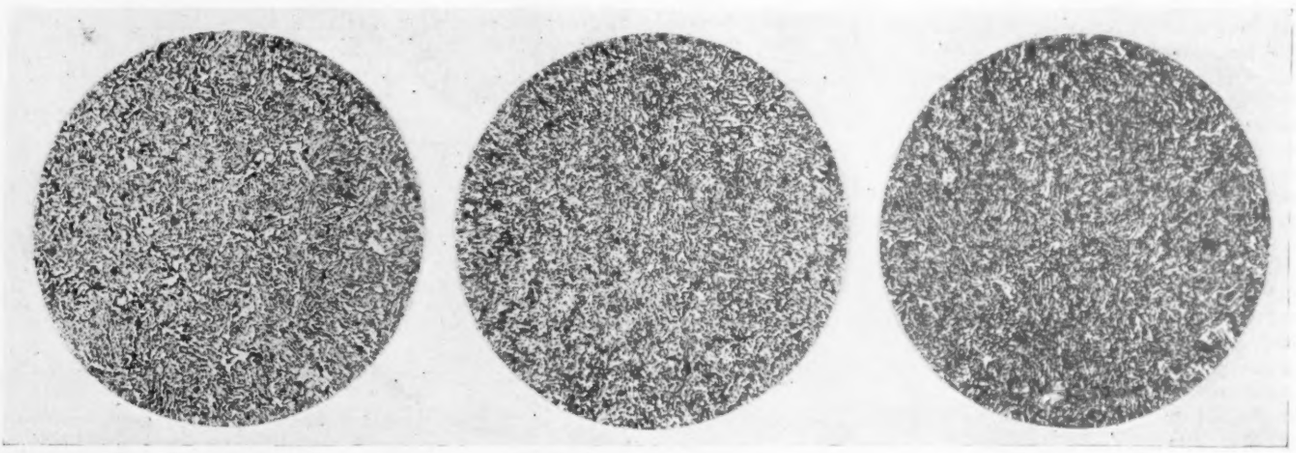


Fig. 2a (left)—Microstructure of a 0.30 per cent carbon 1-inch round, water quenched and tempered. Fig. 2b (center)—Microstructure of a 0.41 per cent carbon 1-inch round, water quenched and tempered. Fig. 2c (right)—Microstructure of a 0.41 per cent carbon 2-inch round water quenched and tempered

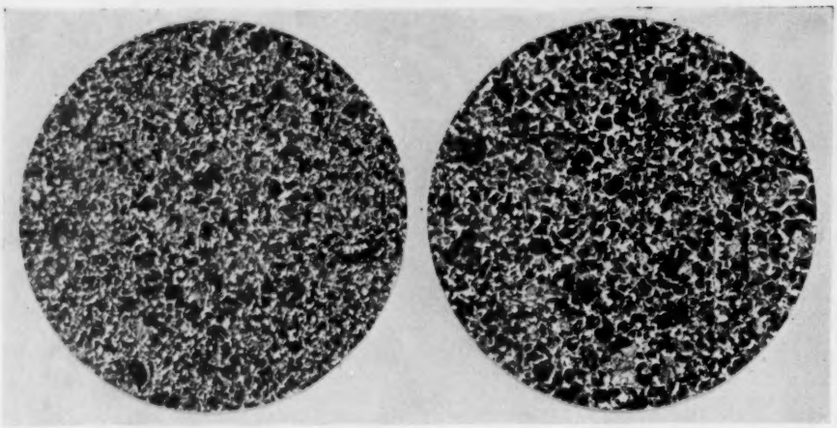


Fig. 3a (left)—Microstructure of a 0.41 per cent carbon 1-inch round, normalized.
Fig. 3b (right)—Microstructure of a 0.41 per cent carbon 2-inch round, normalized

forces to which they are subjected in service.

Usefulness of these special purpose steels is appreciated by engineers generally and their application to specific automotive requirements well understood. The value of the part, such as gear, spring, bearing and the like, is measured directly in terms of the physical properties of the steel from which it is made. Steel properties and part behavior are inseparable, and selection is based upon general consideration of economy weighed against the degree of these desired.

There is, however, another important class of automotive parts for which alloy steels are used profitably but for reasons not so evident. Such parts are included by the broad term "medium-stressed" forgings and include: Crankshafts; connecting rods; steering arms; axle shafts; highly stressed bolts; universal joint parts; spring brackets; and, in fact, all the power or load carrying parts not included in the special purpose group.

Service Demands Are Moderate

Here we find no such absolute inter-relation between properties of the steel and function or life of the part. In comparison with the heavy-duty parts, service demands for strength and toughness or other physical characteristics are only moderate. Tensile and dynamic properties beyond these limited requirements are not directly reflected as an improvement in the performance of the part, nor can they be used economically in design to effect decreased weight or other constructional improvement beyond restricted limitations.

What role, therefore, do alloy steels play in the manufacture of such parts, and what are the technical qualifications of such steels? The answer lies in the general fact that the composition of the steel determines to a large degree not only the *nature* of the part but also the *processes* to make it.

Conversion of a steel bar or billet into a finished axle, crankshaft, etc., involves forging, heat treating and machining. In modern plants, each of these general operations is highly specialized. Mass production has demanded successive refinements until the point now has been reached where efficient operation and consequently ultimate cost is greatly dependent upon the inherent properties of the metal worked. Thus, shearing characteristics, the manner in which the steel flows in the dies, susceptibility to checking, influence of over-working or occasional over-heating, ease of trimming, to name only a few in the forging operation, are characteristics of decided economic importance.

Heat treatment also is influenced greatly by inherent steel properties. Normality, grain size, and uniformity of microstructure along with composition have their effect upon the sensitivity of the hardening reactions to time and temperature. Their bearing upon practical considerations in heat treatment is obvious. In like manner, machine shop cost largely is a function of the steel's cutting characteristics and the degree of their uniformity.

Steel and Processes Linked

Thus steel characteristics and fabrication processes today are closely linked; and, in the same manner that alloy steels are developed to overcome design and service difficulties, so can the effects of alloys on steel properties be directed to alleviate the problems of plant operation.

It is not the intention to differentiate too strongly between these two types of steel. After all, the considerations affecting each are identical in kind. Commercial success depends in both instances upon steel properties weighed against adaptability to process and price. The classification is simply one of degree. In the special steels, important individual physical

Of the authors, H. T. Chandler is assistant to president; and C. N. Dawe is manager, automotive division, Vanadium Corp. of America, 122 Broadway, New York.

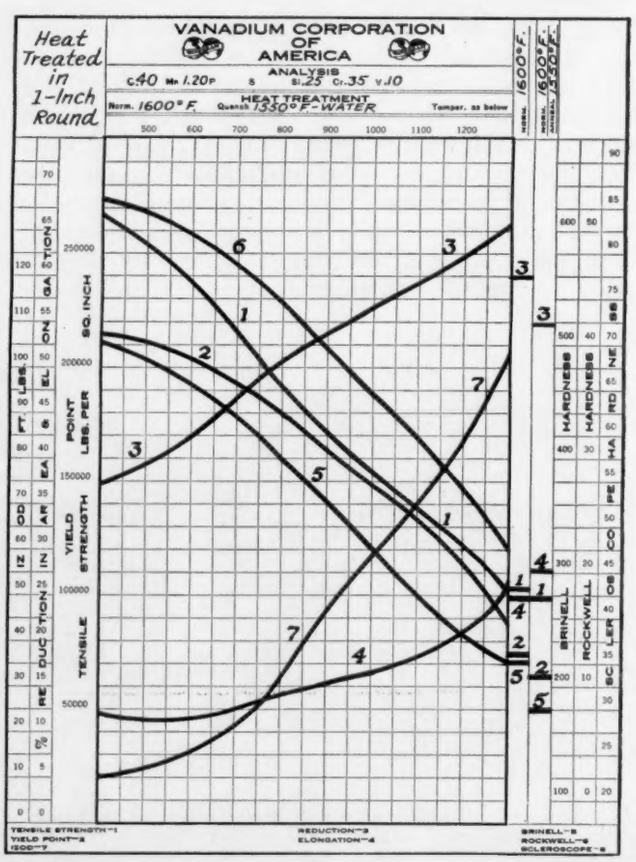

Heat Treated in 1-Inch Round
VANADIUM CORPORATION OF AMERICA
ANALYSIS
C.40 Mn 1.20 P S Si.25 Cr.35 V.10
HEAT TREATMENT
Norm. 1600° F. Quench 1550° F.-WATER Temper, as below
1600° F.
1550° F.
500 600 700 800 900 1000 1100 1200
TENSILE STRENGTH YIELD POINT REDUCTION ELONGATION BRINELL ROCKWELL SCLEROSCOPE
FT. LBS. IZOD
LBS. PER SQ. INCH
BRINELL HARDNESS
ROCKWELL HARDNESS
SCLEROSCOPE HARDNESS
1 2 3 4 5 6 7

Fig. 4—Typical tensile and impact values afforded by the new forging steel. Quenching temperatures vary between 1525 and 1600 degrees Fahr. according to the carbon range employed and the section quenched

characteristics *must* be developed to high values at considerable concession to adaptability to process and price. In these more "general purpose" forging steels, a better balance between all the essential qualifications is possible, and the commercial merit of such steels is judged by the extent to which this balance is attained.

Other Steels Substituted

Many of the present alloy steels suitable for general forging purposes were developed when tensile and dynamic requirements were more severe than they are now. Increased knowledge of the causes of part failure and the incorporation of this information in design, together with improved road conditions have considerably lessened the burden imposed upon many of the materials of motor car construction. The automotive manufacturer naturally has desired to take practical advantage of these facts in lower steel costs.

Thus, full chromium - vanadium, chromium-molybdenum, chromium-nickel, and 3½ per cent nickel, though once quite generally used for the medium-stressed parts listed earlier in this article, have been replaced to a great extent by less expensive materials. Whether the change represents true economy is debatable, but the fact remains that there has been extensive substitution by the simple chromium and manganese steels, while in some instances carbon steels have been employed. Neither procedure is entirely satisfactory as in each case the desired balance has been upset in favor of price.

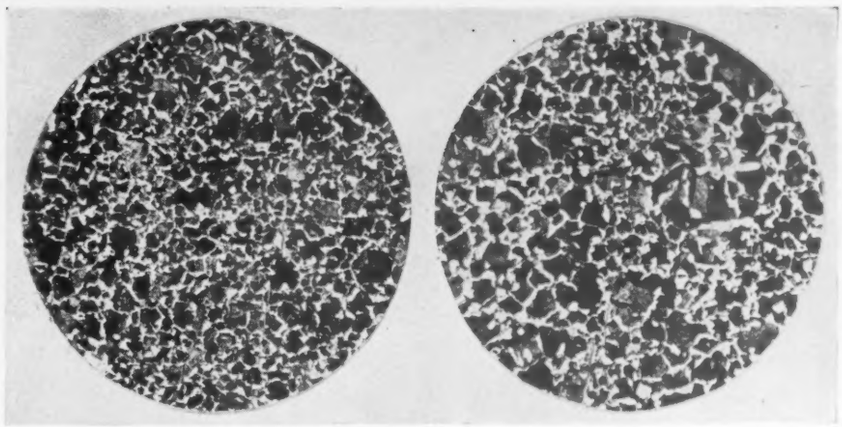


Fig. 5c (left)—Microstructure of a 0.41 per cent carbon 4 x 4-inch edge, normalized. Fig. 5d (right)—Microstructure of a 0.41 per cent carbon 4 x 4-inch center, normalized

It is evident from even a casual consideration of the function of axles, crankshafts, spindles, and the like, that their successful operation is not entirely independent of steel characteristics. Failure of vital units in service always is a serious matter and, in consequence, substantial safety factors are necessary. Tensile and dynamic properties, though moderate when compared, for example, with springs, nevertheless are sufficiently high to give some concern to both steelmaker and user.

While it is possible by careful manufacture, selection and heat treatment of plain carbon steels to meet these requirements, it is only barely so. To permit some latitude in both design and plant operations, the metallurgist using carbon steels has been obliged more and more to restrict his specifications by narrowing chemical limits, inserting clauses aimed to control grain size, normality, etc., and otherwise imposing burdens upon the steelmaker. In many cases, the refinements necessary to successful practice have cost more in the end than was saved by low first cost of the steel. Such efforts to make a steel perform outside of its natural class are misdirected and, in any event, false economy.

Involves Costly Operations

While the less expensive and more simple of the full alloy steels have the advantage of potentially much higher tensile and dynamic properties than carbon steel and, consequently, permit more latitude to the designer, they nevertheless have serious objections of their own. Since they are essentially heavy-duty steels and by no means the best of these, they carry with them some of the less attractive features of this class of materials, that

Table I

Properties of New Automotive Forging Steel

1-Inch Round Bars, Water Quenched and Tempered

Carbon, per cent	Tempered, degrees Fahr.	Yield Point, lbs. per sq. in.	Tensile Strength, lbs. per sq. in.	Elongation per cent, in 2 in.	Reduction of Area, per cent	Brinell Hardness	Izod, ft.-lbs.
0.27	1000	121,000	128,000	20	64	262	91
0.27	1100	110,000	117,000	24	66	235	103
0.30	1000	128,000	139,000	19	62	286	81
0.30	1100	117,000	128,000	22	63	262	90
0.38	1000	139,000	148,000	19	56	302	60
0.38	1100	130,000	138,000	20	58	277	72

Table II

Physical Properties of Normalized Crankshafts

Crankshaft No.	Yield Point, lbs. per sq. in.	Tensile Strength, lbs. per sq. in.	Elongation, per cent in 2 inches	Reduction of Area, per cent	Brinell Hardness
1	70,000	109,700	20.0	53.0	221
2	75,000	114,000	20.0	50.0	231
3	69,500	108,900	19.5	59.6	228
4	75,000	112,000	19.0	57.0	228

Table III

Uniformity of Properties from Melt to Melt

4 x 4-Inch Section—0.40 to 0.45 Per Cent Carbon Grade—Normalized Only

Heat No.	Section	Yield Point, lbs. per sq. in.	Tensile Strength, lbs. per sq. in.	Elongation, per cent in 2 inches	Reduction of Area, per cent	Brinell Hardness	Izod, ft.-lbs.
1	Edge	80,100	118,100	22.0	53.1	229	23.8
	Center	72,500	111,400	23.5	53.8	217	30.8
2	Edge	75,600	114,200	23.5	53.0	217	22.5
	Center	70,300	108,500	25.0	53.2	216	27.3
3	Edge	78,100	113,800	23.5	54.1	224	26.5
	Center	76,700	117,300	22.0	50.2	229	20.8
4	Edge	74,000	119,100	22.0	53.2	226	22.5
	Center	74,700	119,000	22.0	53.1	232	24.0

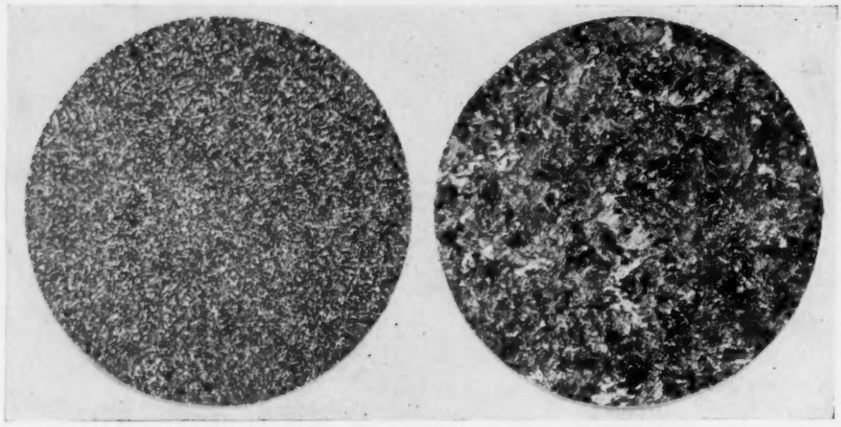


Fig. 6a (left)—Microstructure of a 0.53 per cent carbon 1-inch round, oil quenched and tempered. Fig. 6b (right)—Microstructure of a 0.63 per cent carbon 2¼-inch round, normalized

is, reduced machinability, sensitivity to composition variation and temperature and, in addition, are subject to many defects requiring great care and inspection for their elimination. Here, too, successful practice is attained only through highly restricted specifications and costly control of operations.

In view of these facts, the need for an intermediate alloy steel specifically suited to practical and economic requirements of manufacture of this group of automotive parts is clearly evident, and such a steel is here proposed.

New Balanced Composition

After extensive research and investigation, a manganese-chromium-vanadium composition was selected. The following specification is adequate for the class of parts discussed, the higher carbon type being especially suitable for normalized forgings:

	Per cent
Carbon	0.27–0.45
Manganese	1.05–1.30
Vanadium	0.08–0.11
Chromium	0.30–0.40
Sulphur	0.05 max.
Phosphorus	0.04 max.

Individual carbon ranges may be specified to meet the particular requirements of selected parts. It will be noted that each of the alloys—manganese, chromium, and vanadium—is used in only moderate amounts. The total alloy content, however, is sufficient to assure ample tensile and dynamic properties. Their respective amounts are so proportioned as to give the optimum balance between adaptability to the operations of forging, heat treating, and machining and moderate cost.

Content Is Lower

Though the vanadium content is less than in the full chromium-vanadium steels of S. A. E. 6100 type, it is nevertheless present in sufficient amount to confer upon this particular composition, in sections of this general size, refinement of grain structure and to restrain grain growth, increase diffusion rate, substantially raise the elastic ratio, and, in general, to confer many of the other well-known characteristics of vanadium steels, particularly in the reliability with which uniform behavior and properties are obtained in mass production.

This steel is essentially a water quenching steel throughout the range of composition given. Quenching temperatures vary between 1525 and 1600 degrees Fahr., according to carbon range employed and the section quenched. Typical tensile and impact values which can be expected within the size range of this group of automotive parts are shown in Table I and the chart, Fig. 4.

For parts requiring a yield point within the range of 100,000 to 135,000 pounds per square inch, this composition provides entirely adequate and safe values of ductility and dynamic strength. The microstructure is exceedingly fine both for the normalized and quenching steel and is uniform from melt to melt and throughout a wide range of sections. Fig. 2 *abc*, Fig. 3 *ab* and Fig. 5 *cd*.

Uniformity Stressed

The well-balanced composition with the presence of vanadium accounts also for the excellent and unusual properties of this steel in the normalized state. In fact, for parts of such general dimensions as an automotive crankshaft, the physical properties of this composition, when simply normalized, equal or exceed the corresponding properties of quenched and tempered carbon steel of the S. A. E. 1040 type.

This characteristic has been applied in the manufacture of many thousands of automotive crankshafts, whereby the difficulties incident to the quenching operation, such as warpage, with the attendant straightening operations, irregularities of hardness and the like, have been eliminated, resulting in a superior product at a lower cost. Typical physical properties obtained from such normalized crankshafts made of steel in the 0.40 to 0.45

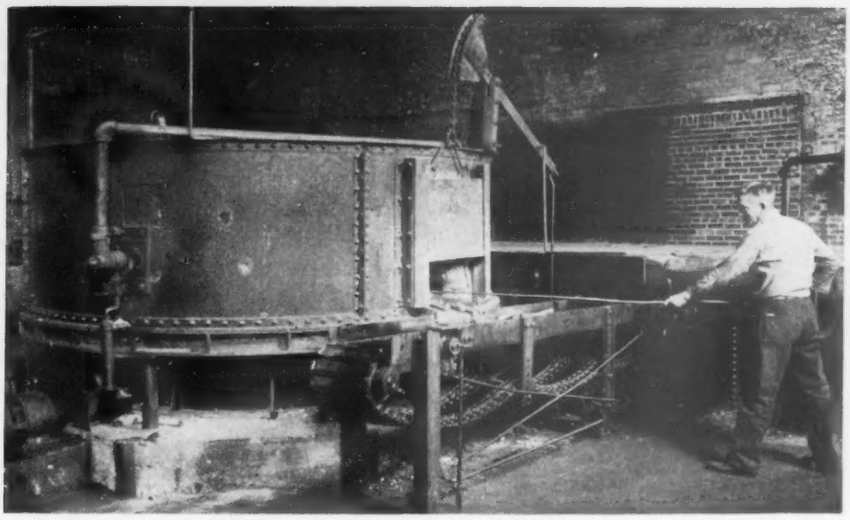
(*Please turn to Page* 30)

Table IV

Physical Properties of Various Compositions

Composition C.	Mn.	Cr.	V.	Tempered, degrees Fahr.	Yield Point, lbs. per sq. in.	Tensile Strength, lbs. per sq. in.	Elongation, per cent in 2 inches	Reduction of Area, per cent	Izod, ft.-lbs.
1-Inch Rounds Normalized									
0.09	1.01	0.32	0.11	.....	44,700	58,050	41.0	80.6	108
0.13	0.97	0.37	0.10	.....	57,800	72,050	36.5	74.7	104
0.20	1.38	0.35	0.09	.....	68,150	91,000	31.5	68.3	98
0.28	1.10	0.35	0.10	.....	71,400	94,800	30.0	67.0	86
0.28	1.38	0.38	0.11	.....	71,800	102,850	28.0	64.0	93
0.41	1.19	0.34	0.11	.....	76,150	111,300	26.0	62.1	49
0.53	0.96	0.44	0.10	1100	77,800	121,200	23.0	52.8	....
0.63	1.05	0.37	0.11	1100	74,000	130,950	20.0	48.8	....
0.73	1.04	0.42	0.10	1100	75,470	140,600	18.0	39.8	....
1-Inch Rounds Water Quenched and Tempered									
0.14	1.03	0.73	0.11	350	75,350	125,400	32.0	34.7	43
0.14	1.02	1.15	0.11	350	99,150	142,800	18.5	41.3	30
0.18	1.05	0.75	0.11	350	99,650	151,400	15.5	31.8	18
0.18	1.17	1.18	0.11	350	98,150	163,000	12.5	33.4	23
0.13	1.89	1.22	0.10	350	119,400	154,300	16.0	47.8	42
0.16	1.78	1.18	0.12	350	121,000	177,500	12.0	43.4	27
0.31*	1.66	0.65	0.17	900	157,750	166,250	17.0	61.8	70
0.32	1.09	0.94	0.10	900	166,350	173,700	16.0	56.5	46
0.32	1.86	0.38	0.11	900	162,200	166,850	16.0	57.3	57
0.34	1.09	0.65	0.10	900	152,950	164,450	15.5	53.3	50
0.42	1.09	0.65	0.09	900	174,600	183,450	15.0	50.6	32
½-Inch Section Oil Quenched and Tempered									
0.53	0.96	0.44	0.10	900	167,250	183,100	15.0	51.0	27
0.63	1.04	0.37	0.11	900	172,550	186,200	15.0	46.2	21
0.73	1.04	0.42	0.10	900	179,750	194,750	14.0	44.8	17

*Contains 0.73 per cent silicon.



Rotary-hearth heat treating furnace, with single opening for charging and removal of stock. Heated bolts drop onto the slat-type conveyor in the forground which transfers them to the quench tank at the right

Special Furnace Equipment Used for Bolt Production

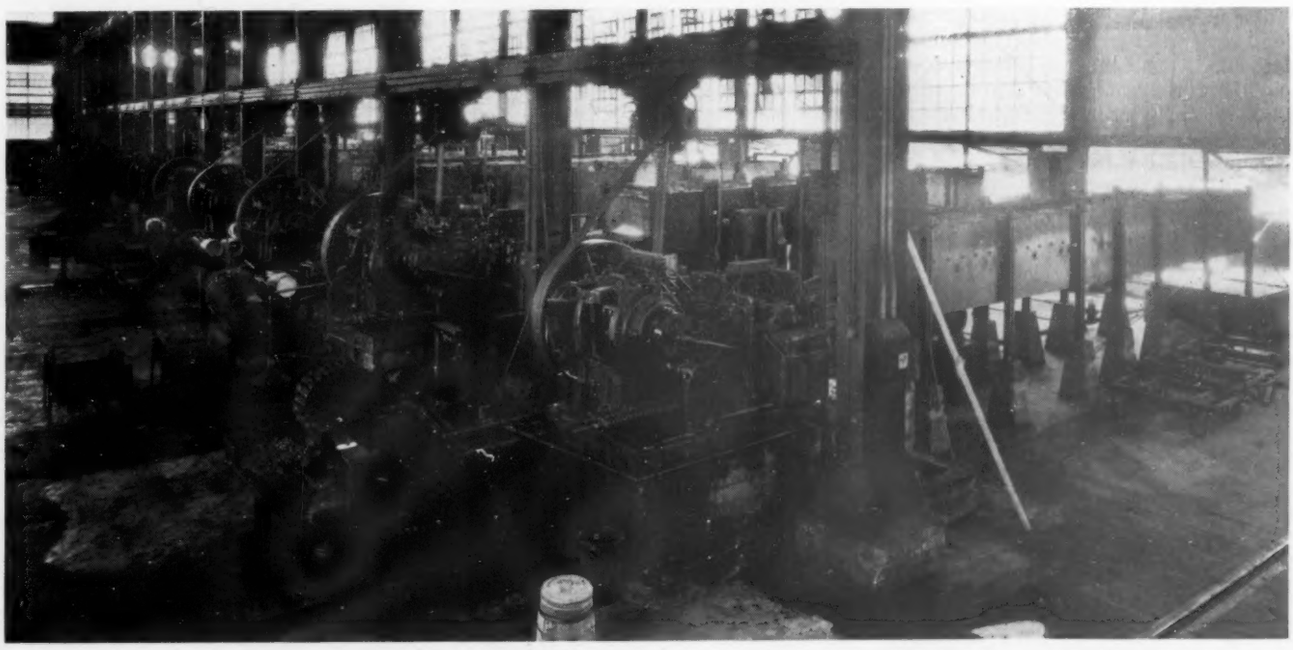
BY J. B. NEALEY

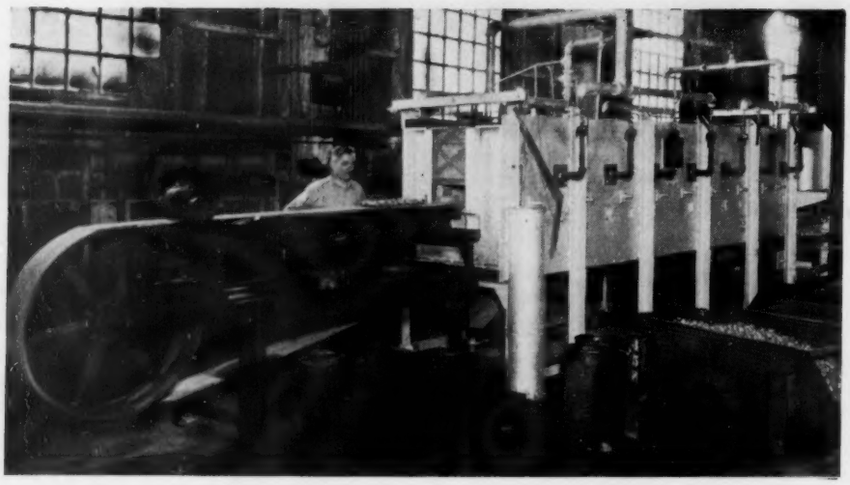
QUANTITY production of bolts, nuts, rivets and the like, in sizes of ½ to 2¼ inches diameter and lengths up to 34 feet, requires a variety of equipment for shearing, forging, tapping and threading, as well as a full complement of heat treating furnaces and quenching devices.

One of the largest manufacturers of the above items, as well as allied products, is the Pittsburgh Screw & Bolt Co., with plants in Pittsburgh, Neville Island, Morristown, and Monaca, Pa.; Hammond and Gary, Ind., and Chicago. It is of interest to note details of some of the production equipment operated by the company at its Neville Island plant.

With large sizes being made, hot work is the practice, and the hot forging division contains 14 gas-fired furnaces serving as many automatic machines making bolts, nuts and rivets. These units are in a single row, with the charging ends of the furnaces near the wall of the building. The raw material yard, served by overhead traveling cranes, is just outside the building and the stock is fed through openings in the wall, directly into the furnaces. Stock is fed from a series of concrete piers, as high as the furnace hearth, and ro-

ROW of automatic bolt heading machines, each served by a long gas-fired furnace in which stock is heated. To keep the headers in continuous operation bars are fed direct from the material yard in the background, through the furnaces and into the machines





Gas-fired heat treating furnace equipped with endless alloy steel belt on which work is moved through heating zone

tating magnetized rolls move the long steel rods and bars into the furnaces.

These furnaces are 27 feet long, 3 feet square in cross section and stand on 4-foot legs. Some are fired with 24 venturi-type gas burners located on one side wall. The entire set of burners on one furnace is supplied with high-pressure gas through one manifold and air through another. Other furnaces are fired with eight nozzle mixing burners set in one side wall, using low-pressure gas and air from a blower. In the nozzle mixing burner system the air and gas manifolds are close together, with a valve in each, one above the other so that one stem serves for both. This stem is attached to a motor which turns on or shuts off both air and gas simultaneously. On three of the furnaces there are 16 gas burners, 8 on each side.

Conveyed Through Quench

Furnaces are provided with quench tanks so that the work may be hardened on the forging heat when so desired. Each tank has a closed loop chain conveyor comprising two chains with cross slats. These chains are suspended from sprockets at both ends of the tank in such a manner that the upper half of the conveyor dips down in the tank while the lower half is below the tank and out of the way. The hot work is ejected from the headers directly onto the conveyor and when no quench is desired the water or oil is drawn out of the tank.

Machines making nuts have no quench but discharge directly into a rotating steel cylinder, perforated so that the scrap will fall out; nuts are discharged at the opposite end. In another part of this division are 11 slot-type furnaces with 4 x 6 foot hearths serving bolt and rivet headers.

In the heat treating division is a rotary furnace for the hardening heat and a long conveyorized furnace for drawing, both of which are shown in accompanying illustrations. The rotary unit is about 14 feet in diameter, 3 feet high and set on short legs projecting from a concrete foundation. Work is charged and discharged through single opening.

Hearth Mechanism Rebuilt

A cylindrical vertical pier of refractory material rises through the center of the furnace, against which the gas burners, located in the outside wall, fire. The hearth travels on rollers and is propelled by a small motor and pinion which meshes with a large gear attached to the hearth. Originally both hearth and center were rotated but frequent breakdowns occurred. At that time, too, the hearth was covered with overlapping plates of heat-resisting alloy which buckled at high temperatures (1600-1700 degrees Fahr.), thus causing more trouble.

The furnace was rebuilt, eliminating the plates, making the refractory center stationary and constructing a separate hearth of refractory brick. The roof was lowered 18 inches to clear the hearth by 16 inches, while the distance between the outer and inner walls was made 2 feet. Thus the heating chamber is now 16 x 24 inches in cross section. As the hearth is now much lighter, mechanical difficulties disappeared.

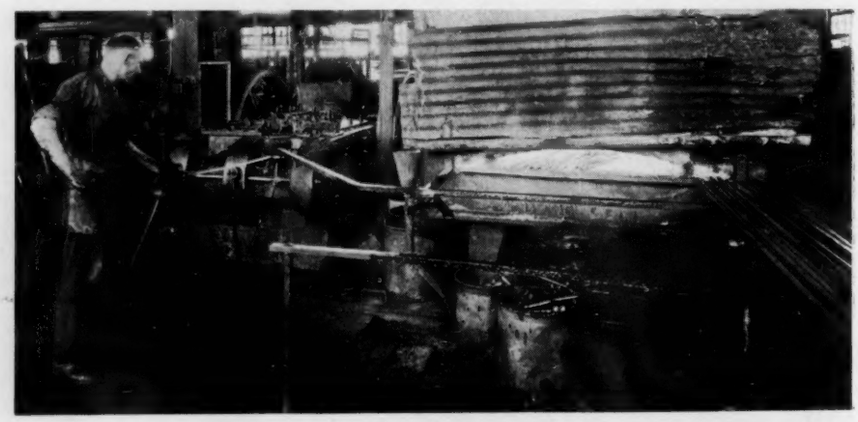
Heat is supplied through three nozzle mixing type burners with gas at 8-ounce pressure and air furnished by a blower at 24-ounce pressure. The hearth is equipped with a sand seal. In front of the furnace is a motor-driven, slat-type conveyor that is reversible. When driven in one direction the work is delivered into containers but when operated in the opposite direction the work is discharged into a quench tank. In the latter case the work falls through the quench to a flight conveyor which moves it through and out of the quench into containers. Oil is the usual quenching medium and is circulated by pump through a cylindrical tank equipped with cold water coils, to keep it cool. When not in use this oil is pumped into a storage tank outside the building.

The drawing furnace, 18 feet long, has a flat, heat-resisting alloy mesh belt, motor driven and extending 8 feet beyond the furnace as an aid in loading. The sides of the furnace hearth are built up approximately 3 inches to keep the work from falling off. Heat is supplied by seven gas burners on each side, 14 in all, which overfire the work. These are of the high-pressure venturi type. The belt is filled with work and run into the furnace, the furnace is closed and heat is applied for the proper length of time.

Now Making Steel Propellers

The heat treating cycle includes quenching from 1600-1700 degrees Fahr., after the work has been heated from ½ to 1½ hours, depending upon size, material and similar factors. Drawing is accomplished at 1200 degrees Fahr. and the heating period ranges from 1 to 1¼ hours.

This company has also undertaken the manufacture of a hollow steel airplane propeller, one of which was



Slot-type furnace, gas fired, in which stock is heated before being transferred to the bolt heading machine at the left

RECENTLY installed propeller division, where complete facilities are maintained for forming, finishing and testing hollow steel airplane propellers

used by Wiley Post in his now-famous round-the-world solo flight. A separate division is maintained for experimental and production work in this field, general view of which is shown in an accompanying illustration.

Made from two tapered plates of S.A.E. 6130 steel, bent to a triangular shape with a rounded edge and welded together, the propeller has high strength and light weight. Tensile strength of the material is claimed to be over 125,000 pounds per square inch; yield point 110,000 pounds per square inch. This is of course considerably more strength than can be obtained either in duralumin or wood. Weight of the finished steel propeller is reported to compare favorably with these other materials.

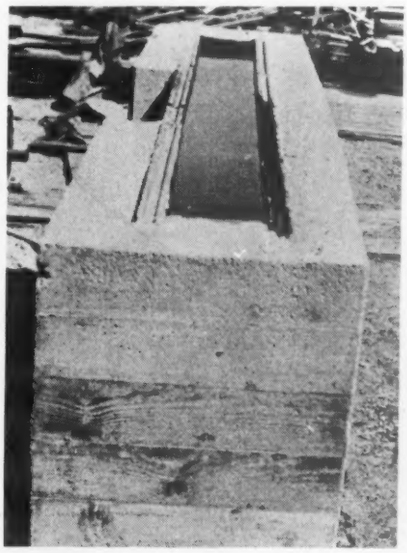
Concrete Tanks Lined with Asphalted Tile Found Suitable for Pickling

CONCRETE which is lined with asphalt-impregnated tile capable of resisting action of sulphuric acid is offered as a new material for use in the construction of pickling tanks. This new insulated lining has been developed by the Pan-Pacific Piling & Construction Co., Berth 140, Neptune street, Wilmington, Calif.

Experiments conducted over a period of years at Los Angeles harbor have demonstrated that concrete piers could be insulated against the destructive effects of sulphate in sea water by impregnating the concrete with asphalt under the vacuum-preasure process, similar in many respects to the process employed in creosoting piles. Engineers state that properly impregnated concrete piling should last 75 years or more.

Clay Tile Also Treated

The same process has been extended to clay tile, obtaining impregnation to a depth of 2 inches, or complete impregnation when the tile is less than 2 inches thick. The cost of treatment is said to be sufficiently low to permit the use of the tile for lining sewers and disposal tanks, metal pickling tanks, drainage pipes, irrigation ditches, and the like. To facilitate placement, the tile is produced in sections.



Courtesy Warren Bros. Co.

Concrete tanks lined with asphalt-impregnated tile as shown here are resistant to sulphuric acid and therefore suitable for pickling tanks

For pickling tanks, tile 12 inches square and 1-inch thick with a center panel ½-inch thick will be used, these tile being similar to the slabs prepared for use in sewers. They will be treated with a specially-prepared asphalt with very high melting point. When the slabs are assembled in a tank, the joints will be made of the same asphalt.

For the production of the tile, a clay with a minimum amount of noncolloidal element and free from mineral sulphates and other solubles is selected. This bakes up with a certain degree of porosity, that is, not too dense to prevent thorough impregnation of the asphalt. The tile then is placed in a retort, the air is exhausted and the temperature raised slowly to 250 degrees Fahr., at which point hot asphalt is forced in under pressure. The tile is allowed to cool in the retort in gradual drops of temperature.

The impregnated tile has been immersed in 50 per cent and 75 per cent volume sulphuric acid for months and the laboratories report no change in the tile; tests indicate that the insulation is as effective as is the insulation of asphalt-impregnated concrete. The material also has been boiled, including the joints, in 10 per cent sulphuric acid for hours without any defect being detected. The asphalt remained intact and did not soften or melt. It is claimed that no harm will be done if the surface is abraded because the impregnated tile will resist the action of the hot acid.

Film Describes Wire Rope

A motion picture "Preformed Performance," with synchronized music and comment by Edwin C. Hill, noted newspaper reporter and radio commentator, has been made by the American Cable Co., New York, to

promote sales for wire rope. The picture, with Mr. Hill's comments, presents details of manufacture and applications of wire rope. Arrangements have been made to have copies of the film as well as projection equipment in Western Union offices of the larger cities.

Coal Mining Company Uses Welding To Build Bridge of Old Pipe and Rails

CONFRONTED with the necessity of providing a new opening for its No. 5 mine at Sublet, Wyo., because the haulage distance from the old opening had become too long to be economical, the Kemmerer Coal Co. solved its problem by constructing 9300 feet of mine track and building an arc welded steel bridge 393 feet long and 52 feet high.

The No. 5 vein was tapped through a rock tunnel 80 feet at a point which was only about 9300 feet from No. 5-A tipple but three miles from No. 5 tipple used previously. To move No. 5 tipple from its old location to the new would have proved expensive and would have meant building a mile of new railroad track, storage yards and other facilities.

Track Spans Highway

To utilize No. 5-A tipple, not being used to full capacity, required only constructing the 9300 feet of mine locomotive track which was considerably cheaper than standard railroad track. The most serious drawback to this scheme, however, was the necessity of crossing a gully, at the bottom of which was a creek and the main highway from Kemmerer to Yellowstone National Park.

A survey showed that a good track, with a grade of about 0.65 per cent in favor of the load, could be laid by constructing the bridge with a span of 393 feet 4 inches and 52 foot height over the highway.

Little money was available, therefore, the company looked around for some inexpensive method for building this bridge. There was at hand an accumulation of 10-inch steel pipe and a considerable amount of scrap rail in various mines which had been closed down.

The coal company designed and with the aid of an arc welding set manufactured by the General Electric Co., Schenectady, N. Y., built the bridge from the old pipe and rail. The only new metal utilized was 135 pounds of General Electric type F electrode. As all of the old metal already had been written off the books, the cost of the bridge was but little more than the cost of electrodes and labor.

This bridge, 393 feet long and 52 feet high, was built by arc welding, using as material old steel pipe and rails. The only new material required was 135 pounds of welding electrode

Approve Lead-Lined Steel Drums for Chemicals

A steel drum with a bonded lead lining, known as I.C.C. 5 H drum, recently has been approved by the bureau of explosives of the American Railway association, New York, for transporting corrosive chemicals. This type of drum was recommended by the Manufacturing Chemists association and passed rigid tests before adoption by the bureau.

The container has a homogeneous lead coat lining with a minimum thickness of 3/32 inch. It will be used for such materials as sulphuric, phosphoric and hydrofluoric acids, being satisfactory for sulphuric acid up to 1.85 specific gravity and 66 degrees Baume, as well as numerous corrosives the attack of which is resisted by lead.

Advantages claimed for this type of drum are elimination of breakage, which saves both containers and chemicals and prevents damage to adjacent goods; long life; lower handling cost because of lessened care; greater safety; and minimum storage space required because of crate elimination and because there are no necks to necessitate special stacking. In addition, these containers may be drained under pressure, reducing time and trouble in this operation.

This lead-coated drum was pioneered and developed by the Republic Lead Equipment Co. and Republic Steel Package Co., 7930 Jones road, Cleveland, and has been manufactured by them for a number of years.

Develops New Alloy Steel For Auto Forgings

(*Concluded from Page* 26)

per cent carbon range are shown in Table II.

The uniformity of physical characteristics obtained through normalizing this steel far exceeds that possible by the quenching and tempering of carbon steel, and this is reflected in decreased effort and costs of machining. In addition, the finished shaft is free from internal stresses and is not subject to warpage in service. The uniformity of physical properties from melt to melt and throughout sections even beyond the range of automotive sizes is shown in Table III.

Suggest Name "Normalloy"

From the discussion of characteristics in both the normalized and quenched and tempered conditions, it is evident that the steel is truly a general-purpose steel applicable to a wide range of engineering requirements. The name Normalloy has been suggested for this manganese-chromium-vanadium steel and is particularly apt, inasmuch as it serves a dual purpose, indicating that this steel is ideal for parts to be normalized only and, in addition, is a truly "normal steel" and, in consequence, is free from the harmful effects of "abnormality" on quenching and tempering.

In the development of this specification during the past four years, many other melts of manganese-chromium-vanadium steel of varying carbon and alloy content were studied. From the results of these experimental melts a few tests and photomicrographs have been selected and appear in Table IV and Fig. 6*a* and *b*. These are presented as of potential value for carburized parts, high-strength bolts and tubing, and in such applications for harder steels as certain types of not too highly stressed gears and springs, as well as rails, wheels, and the like.

The right to lead - -

The prime requisite of a leader in the industrial field is the genius for the development of new ideas and the ability to adapt these ideas to some useful purpose.

On this we rest our claim to leadership.

Landis developed the tangential chaser—the one definite improvement made in thread cutting methods in recent years.

Landis successfully applied this principle to the needs of a rapidly developing industry and has ever since constantly improved and widened the scope of application by the designing of new machines and die heads.

Today, Landis builds—as standard equipment—**seventy-nine sizes and types of threading die heads, fifty-four different threading machines, twenty-one sizes and types of pipe threading machines and fifty-nine collapsible and adjustable taps.** Each of these die heads, taps and machines is a specialized tool—designed and developed to exactly fit the threading requirements of some branch of the metal working industry.

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LANDIS
for THREADING

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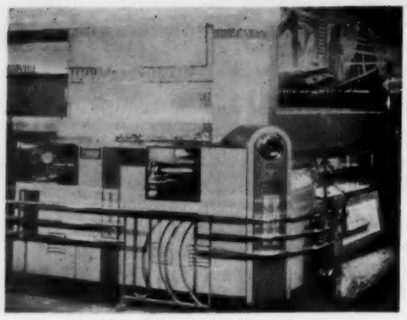

at A

CENTURY OF PROGRESS

ABILITY of special alloy metals to withstand forces of corrosion, wear and heat is demonstrated in the exhibit (shown above) of Haynes Stellite Co., one of the units of Union Carbide & Carbon Corp. Difficult tests are performed; nevertheless, industry imposes even more strenuous conditions.

A continuous comparative corrosion test between haystelloy and ordinary steel is run, sections of the two metals being suspended in a bath of hydrochloric acid. The alloy has been there since the exposition started, but the steel must be replaced each day.

In another display, a bar of stellite and a bar of steel are fed automatically against a grinding wheel running continuously. Gages show that the steel wears seven times as fast as the alloy. In a third illustration, the flame of an oxyacetylene blowpipe brings a stellite cutting tool to a red heat while the tool is being used to cut a billet of steel. Although a pyrometer shows the temperature to be between 1200 and 1400 degrees Fahr., the tool will perform several days before resharpening is necessary.

♦ ♦ ♦

Paid attendance at the fair has increased consistently about 50 per cent each month since its opening. Average daily attendance in June was 83,416, in July 129,868 and in August 188,091, giving an average of 136,234 for the three months. Total attendance passed 15,000,000 on Sept. 14, at which time the fair had recorded a gain of 55 per cent in number daily average visitors and an increase of 25 per cent in total over the attendance on the corresponding date at the Columbian exposition of 1893 which attracted a total admission of about 21,500,000.

The latter fair opened nearly one month earlier than the present one which accounts for the difference in daily and total attendance gains. Should A Century of Progress no more than equal the Columbian attendance between now and Oct. 31, the closing date, it will have a final record of 25,000,000 paid admissions. There has been some agitation to reopen the fair next year, but this is unlikely to occur. In opposing such a plan, officials point out that many of the buildings were designed for only brief occupancy and with the purpose of making their parts salvageable. Sale of such material is included in estimates of probable income. A number of building contracts called for demolition as well as erection.

♦ ♦ ♦

The exhibit of the Association of Manufacturers of Chilled Car Wheels, located in the Travel and Transport building, describes the developments in design and production of car wheels since 1849. Featuring this display is a demonstra-

tion of foundry practice in pouring a wheel mold. A ladle apparently pours molten iron into a flask which is cut away to illustrate how the metal fills the mold. Oil, water and lighting effects realistically depict the operation.

♦ ♦ ♦

A 300-horsepower synchronous motor which can be stopped from full speed of 514 revolutions per minute in less than 1 second is demonstrated in the exhibit of the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. In decelerating from full speed to standstill, the motor makes only four revolutions.

This motor was designed for driving a rubber mill, with which were a man's arms to be caught in the slowly moving rubber going into the rolls it would be a serious matter if the mill could not be stopped instantly. It uses full voltage starting and develops sufficient torque to start the rolls when fully loaded.

When the "stop" button is pressed, a double-throw contactor disconnects the motor from the line and connects a dynamic braking resistor across its terminals. The motor then acts as a generator, stopping almost instantly, yet so smoothly that the equipment is not unduly stressed. To safeguard the motor against overheating due to frequent starting and stopping by visitors, a built-in thermostat is attached to the motor winding.

♦ ♦ ♦

Working models illustrate the principles of operation of different types of melting furnaces, including the induction and carbon arc units, in one group of exhibits in the Hall of Science. A model of a carborundum furnace, sponsored by the Carborundum Co., Niagara Falls, N. Y., also is shown. Accompanying these displays is a mural of pictures of several individuals who have contributed to the development of melting furnaces. This mural is similar to those prepared by sandblasting on stainless steel and comprising part of the exhibit of the Union Carbide & Carbon Corp. as described in a previous issue. Depicted in the mural are Acheson, Davy, Heroult, Moissan and Siemens.

Many of the basic principles of chemistry and electricity are explained by simple models which operate automatically. Electrical transcriptions are used widely to broadcast vocal descriptions of various exhibits, making it unnecessary for lecturers to be in constant attendance. Ingenuity in development of working models and of dioramas has done much to increase the effectiveness of what otherwise would be drab exhibits and to aid in explaining technical and scientific processes hitherto a mystery to a large portion of the spectators.

♦ ♦ ♦

Important uses of steel in the petroleum industry are demonstrated effectively in several exhibits devoted to the production and marketing of this product in its various forms. A large oil terminus model illustrates different methods of transportation employed by the indusery, including tank cars, pipe lines, ships and motor vehicles, all of which are made principally of steel. Various types of steel oil storage tanks also are shown. Another model illustrates the process of well drilling, with its use of steel for derricks, casing and drills. A miniature refinery in operation demonstrates the method of treating petroleum, including the cracking of gasoline.

MAKING UNIFORMITY
A *tangible* QUALITY OF WELDING WIRE

Users of Roebling Wire know that its "uniformity" is no theoretical or imaginary talking point. It is tangible. It shows up in the daily work of the welders . . . provides positive aid in their efforts to make every weld strong and durable.

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ROEBLING

THE CUSTOM-MADE WELDING WIRE—FOR EXACTING WELDERS

Making the Most of

METHODS AND MATERIALS

A PROCESS has been developed in England for the production of heat, rust and acid-resisting material using steel or cast iron as a base. The process consists of packing the ferrous material with a mixture of aluminum, chrome oxide and a catalyst in a metallic container and submitting the materials to a temperature of about 1000 degrees Cent. for 3 or 4 hours. An aluminothermic reaction takes place which results in communicating to the object treated a fairly lightly adhering skin of probably alumina, beneath which is a skin of metallic aluminum, and finally the metallic object has been cemented with chromium metal.

$ $ $

The frame of a long draw press broke during a rush production schedule in a metal fabricating plant. A similar experience several years ago, before the plant had adopted the oxyacetylene process for repair and production, had necessitated a week's shutdown while a new frame was obtained at considerable expense. This time, because of the current use of the blowpipe, a bronze welded repair was accomplished over night and at a low cost.

$ $ $

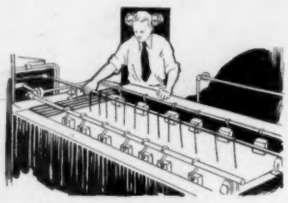
PEELING and chipping of chromium-plated surfaces often are traced to too great a thickness of plate. The plate itself is brittle and will not resist impact or abuse when heavy as well as when light. Chipping and peeling also are noticed more frequently when the parts are subjected to wide temperature variations, probably due to expansion of the part under heat, resulting in fracture of the plate. Nevertheless, chromium has been used safely where such a danger would seem to exist—on diamond boring bars running in bronze bearings at high speed. These bars were about 30 inches long, had an average diameter of 1⅛ inch, and revolved at 1500 revolutions per minute. Due to provision being necessary for fine adjustment on tools in the bar, these bars were costly to make, and plating was resorted to as a salvage medium. The first purposely were plated about 0.010 inch thick. The immediate result was ruined bearings caused by fractured plate. The bars then were refinished to leave 0.001 inch thickness of chromium. They then showed a great increase in life over their initial steel surface performance.

$ $ $

Experiments are being made on nitriding or other means of hardening malleable iron before annealing. One suggested use is in sandblast nozzles.

$ $ $

A Minnesota manufacturer of hand oilers of the pump type cadmium plates the exterior to afford protection against corrosion and rust. With this plating, the finish is permanent, of a clean white attractive



appearance which is popular with customers. This finish is said to have contributed to an increased sale of the oilers. The steel balls used for valves in the pumps also are cadmium plated to guard against pitting and consequent impairment of function.

$ $ $

The higher silicon content found in some of the commercial grades of 12 to 14 per cent rustless irons facilitates welding and reduces their tendency to air-harden. They are, however, more subject to grain growth in the weld and base metal adjacent to the weld. Excessive grain growth results in a brittle condition which in most cases can be remedied, particularly on light-gage metal by annealing at 1250 to 1300 degrees Fahr. Blowpipe annealing for 3 minutes within this temperature range softens somewhat the weld and adjacent metal. After furnace treatment, welds in 16-gage material will stand considerable bending without fracture.

$ $ $

A manhole which locks the cover to the main body has been developed by a manufacturer of steam pipe equipment. Because a high-strength material which will not corrode is required, hot-rolled monel metal is used for several parts.

$ $ $

SMALL sizes of cast iron pipe made by several companies can be welded readily with cast iron rods without preheating. Sizes larger than 4 to 5 inches diameter require some preheating to avoid cracking. These pipe products contain percentages of chromium and nickel which are introduced to increase corrosion resistance to chemical liquids, manufacturing wastes and sewage. Bronze welding is not advisable because of the practical difficulty experienced in making bronze welds on these alloys and also because in many cases the bronze welds would accelerate internal corrosion.

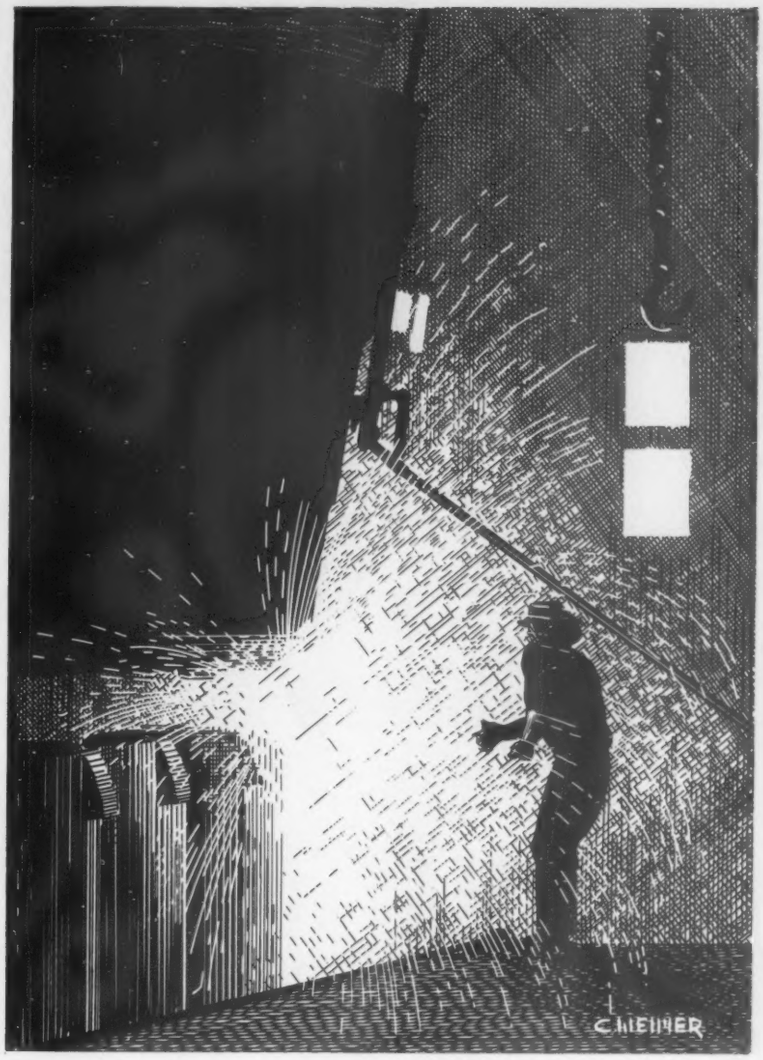
$ $ $

About 2½ years ago a large manufacturer of ball and roller bearings began using chromium plating as a means of reclaiming worn plug gages. Results were so worthwhile that for 2 years it also has specified this plating for new gages because of the economy gained through longer life. Many of the bore gaging operations are done while the work is still in the grinder, thus the gages are subjected to more than ordinary wear due to the presence of grinding abrasive in the holes. In addition, narrow limits of size must be adhered to. From 10 to 30 millimeters nominal diameter, a hole tolerance is maintained at 0.0004 inch. This means that gages can not be permitted to wear more than 0.0001-inch undersize. In spite of these severe conditions of operation the company is able to obtain satisfactory performance by using chrome plated gages. Alloy steel gages formerly used gave a life of from 1500 to 2000 holes; chrome plated gages give from 4000 to 5500 holes. The alloy steel gages previously used were the best obtainable and cost approximately 15 per cent less than the plated gages.

ADVERTISING PAGES REMOVED

National Metal Week in Detroit

Oct. 2-6, 1933



—Etching by Charles Perry Weimer, Chatham, N. J.

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J&L INVITES YOU

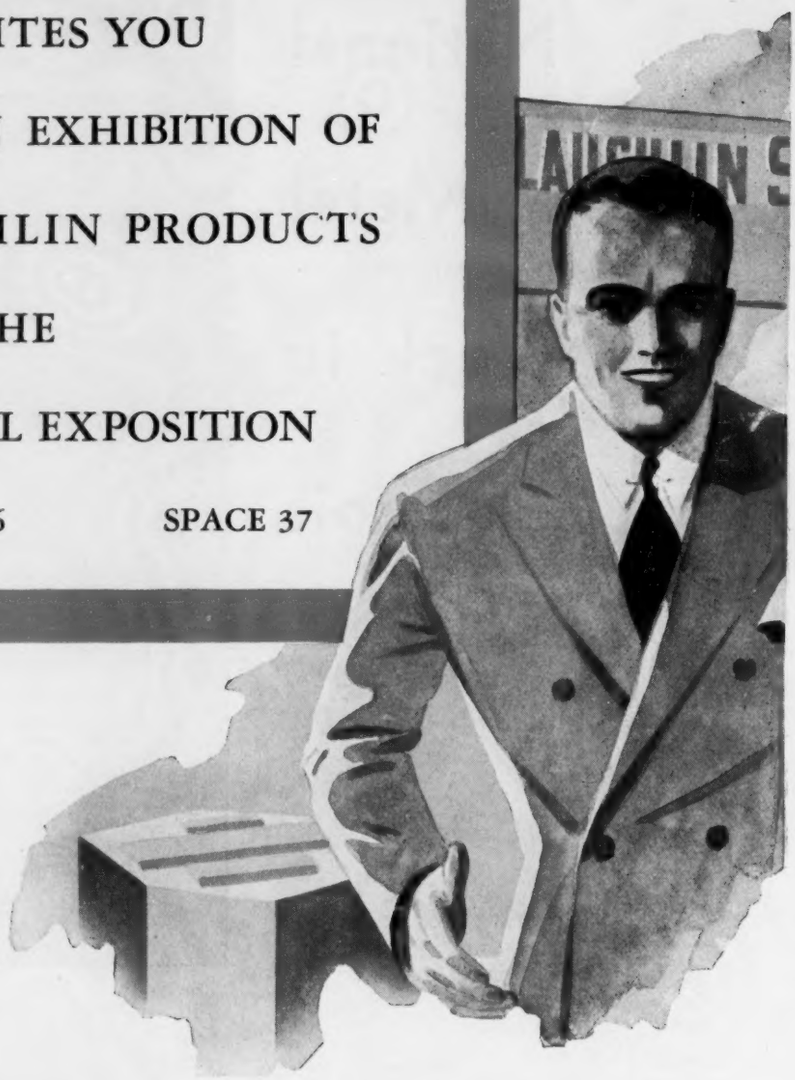
TO EXAMINE AN EXHIBITION OF

JONES & LAUGHLIN PRODUCTS

AT THE

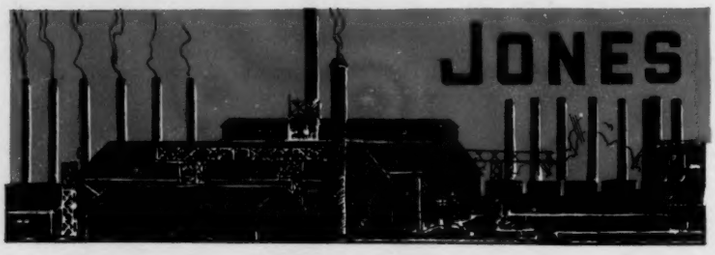
NATIONAL METAL EXPOSITION

DETROIT, OCTOBER 2-6 **SPACE 37**



J&L STEEL

Those who attend the Fifteenth Annual National Metal Congress and Exposition will enjoy the Jones & Laughlin exhibit. The setting, a moving representation of steel making, will be colorful and dramatic. An unusually wide range of J&L products will be presented,



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MOTOR CITY PREPARING FOR METAL CONGRESS AND SHOW

Washington boulevard looking north toward Hotel Statler and Grand Circus park

DETROIT, the capital of motordom, has risen in the span of three decades to rank as one of the most important metal consuming areas in the United States and by that achievement earns its selection for the 1933 National Metal Week. This city, which received similar distinction in 1922 and 1927, stands at the top of American industrial accomplishment. Its numerous and expansive automobile plants and its many other establishments turning out automotive and miscellaneous products stand as monuments to the initiative and confidence of its pioneers.

In these plants, steel and all allied metals in considerable tonnages are pressed, stamped, forged, heat treated, machined and otherwise fabricated and processed into parts which go into the thousands of motor cars rolling each day from the assembly lines into the nation's highways. Within recent years, the Detroit district has improved its position by producing many of the materials which it consumes. Productive facilities include 4 blast furnaces, 18 open hearths, 9 electric furnaces and 41 rolling mills, the latter specializing on sheet, strip, seamless tube and bar products.

All this provides a most appropriate setting for the Fifteenth National Metal congress and exposition to be held in the Motor City, Oct. 2-6. Principal sponsor and originator of the Metal Week idea is the American Society for Steel Treating, but co-operating again this year are the American Welding society, Iron and Steel and Institute of Metals divisions of the American Institute of Mining and Metallurgical Engineers, American Society of Mechanical Engineers and the Wire association.

Headquarters of the American Society for

—Photo by Grossman-Knowling Inc., Detroit

Detroit's impressive skyline as it appears from the Canadian side of the Detroit river

Steel Treating will be maintained throughout the five days at Hotel Statler and here all morning and afternoon technical sessions will be conducted. A total of 30 technical papers will be presented at these sessions; among the subjects included are heat treatment of steel and cast iron, alloys and their composition, surface hardening, tool hardening, age hardening, bright annealing, cold working, steelmaking, physical properties of steel, metal cutting, metallography and radiography.

The Steel Treaters will hold their annual meeting on Wednesday morning at which time officers will present their reports and the nominating committee will submit nominations for officers for 1934. Some discussion is expected to be given the proposed change in name to American Metals society and to certain changes in the constitution regarding the nomination and election of officers. At the conclusion of the business meeting, H. J. French, in charge of alloy steel and iron development, International Nickel Co., New York, will deliver the 1933 Campbell Memorial lecture on "Fatigue and Hardening of Steel."

Medals To Be Presented

Present officers of the society are: President, W. B. Coleman, president, W. B. Coleman & Co., Philadelphia; vice president, W. H. Phillips, vice president, Molybdenum Corp. of America, Pittsburgh; secretary, W. H. Eisenman, Cleveland; and treasurer, A. T. Clarage, president. Columbia Tool Steel Co., Chicago Heights, Ill.

The annual dinner will be served at Hotel Statler on Thursday evening. At this time award of the Henry Marion Howe medal will be announced and the Past President's medal presented to A. H. d'Arcambal, who served as president of the society in 1932.

On four days of the week visitors will be afforded an unusual opportunity for plant visitation. Nineteen industrial plants are opening their doors as shown in the schedule on this page.

All indications point to the largest National Metal exposition since 1929; the exhibits will occupy 50 per cent more space than in 1932.

(*Please turn to page* 49)

Papers Scheduled for A. S. S. T. Sessions

Monday, Oct. 2

10:00 A. M.—Hotel Statler Ballroom

"Thermal Conductivity of Irons and Steels and Some Other Metals in the Temperature Range of 0 to 600 Degrees Cent.," by S. M. Shelton and W. H. Swanger, bureau of standards, Washington.

"The Composition and Critical Temperature of Pearlite Containing 1 Per Cent Silicon," by A. E. Schowalter, W. W. DeLamatter and H. A. Schwartz, National Malleable & Steel Castings Co., Cleveland.

"Alloys of Iron and Manganese, 4 Parts," by Francis M. Walters Jr., Cyril Wells and M. Gensamer, Carnegie Institute of Technology, Pittsburgh, and John Eckel, Gulf Refining Co., Coraopolis, Pa.

2:00 P. M.—Hotel Statler Ballroom

"The Linear Thermal Expansion and Alpha-Gamma Transformation Temperature (A_3 Point) of Pure Iron," by J. B. Austin and R. H. H. Pierce Jr., United States Steel Corp., Kearny, N. J.

"A Study of the Effect of Water Vapor on the Surface Decarburization of Steel by Hydrogen with Certain Developments in Gas Purification," by C. R. Austin, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

"The Action of Oxygen and Hydrogen Sulphide upon Iron-Chromium Alloys at High Temperatures," by R. L. Rickett and W. P. Wood, University of Michigan, Ann Arbor, Mich.

Tuesday, Oct. 3

10:00 A. M.—Hotel Statler Ballroom

"Some Problems of Quenching Steel Cylinders," by Howard Scott, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

"Martensitic Grains in Air-Cooled Low-Carbon Steel and Their Effect on Machinability" by O. W. McMullan, Timken-Detroit Axle Co., Detroit.

"The Life of Turning Tools as Influenced by Shape," by O. W. Boston and W. W. Gilbert, University of Michigan, Ann Arbor, Mich.

2:00 P. M.—Hotel Statler Ballroom

"Investigation of the Treatment of Steel for Permanent Magnets—Part II," by R. L. Dowdell, University of Minnesota, Minneapolis.

"Bright Annealing of Steel in Mixed Gas Atmospheres," by A. L. Marshall, General Electric Co., Schenectady, N. Y.

"The Heat Treatment of Cast Iron," by Carl H. Morken, Detroit Electric Furnace Co., Detroit.

"The Structure and Constitution of an Alloy Steel," by O. W. Ellis, Ontario Research Foundation, Toronto, Ont.

Wednesday, Oct. 4

10:00 A. M.—Hotel Statler Ballroom

Annual Meeting of American Society for Steel Treating. "Fatigue and Hardening of Steels," Campbell Memorial Lecture, by H. J. French, International Nickel Co. Inc., New York.

2:00 P. M.—Hotel Statler Ballroom

"On the Design and Construction of a Precision High-Power Metallographic Apparatus," by F. F. Lucas, Bell Telephone Laboratories, New York.

"Sensitivity of the Gamma Ray Method of Radiography," by J. T. Norton and Alfred Ziegler, Massachusetts Institute of Technology, Cambridge, Mass.

"The Mechanism of Crystal Growth," by Wheeler P. Davey, Pennsylvania State college, State College, Pa.

Thursday, Oct. 5

10:00 A. M.—Hotel Statler Ballroom

"Comparison of Single-Step Long-Time Creep Results with Hatfield's Time-Yield Stress," by A. E. White and C. L. Clark, University of Michigan, Ann Arbor, Mich.

"Low-Temperature Impact Strength of Some Normalized Low-Alloy Steels," by J. J. Egan, Walter Crafts and A. B. Kinzel, Union Carbide & Carbon Research Laboratories, Long Island City, N. Y.

"The Torsion Impact Properties of Hardened Carbon Tool Steel," by G. V. Luerssen and O. V. Greene, Carpenter Steel Co., Reading, Pa.

2:00 P. M.—Hotel Statler Ballroom

"Effect of Cold Working on the Physical Properties of Cold-Headed Bolts," by Carl L. Harvey, Lamson & Sessions Co., Kent, O.

"Basic Open-Hearth Carbon Steel for Cold Heading—Ingot to Wire," by A. B. Arganbright, Wheeling Steel Corp., Portsmouth, O.

"A Study of Banding in Chromium-Molybdenum Steel," by E. R. Johnson and W. J. Buechling, Republic Steel Corp., Massillon, O

Friday, Oct. 6

10:00 A. M.—Hotel Statler Ballroom

"Present Status of Age-Hardening," by Richards H. Harrington, General Electric Co., Schenectady, N. Y.

"Notes on the Aging of Metals and Alloys," by Albert Sauveur, Harvard university, Cambridge, Mass.

"On Grain Size and Grain Growth," by M. A. Grossmann, Illinois Steel Co., South Chicago, Ill.

2:00 P. M.—Hotel Statler Ballroom

"On the Manufacture of Rimming Steel," by William R. Fleming, Andrews Steel Co., Newport, Ky.

"Solidification of Steel in Ingot Molds," by L. H. Nelson, Republic Steel Corp., Buffalo.

"Some Factors Affecting the Physical Properties and Corrosion Resistance of 18-8 Chromium-Nickel Steel Wire," by W. H. Wills and J. K. Findley, Ludlum Steel Co., Dunkirk, N. Y.

"Application of Thermodynamics to the Deoxidation of Liquid Steel," by John Chipman, University of Michigan, Ann Arbor, Mich.

ADVERTISING PAGES REMOVED

Motor City Prepares for National Metal Week

(*Concluded from page* 44)

The show will be housed in Convention Hall which affords excellent exhibition facilities. Approximately 135 companies will be represented with displays and a large portion of the equipment will be operating.

One section of the exposition will be devoted to gas furnaces and appliances, another to electric furnaces and equipment, and a third to welding apparatus and accessories. Other important sections will include steels and steel products, nonferrous metals, heat treating materials, cleaning compounds, heat control apparatus, metallurgical and physical testing devices, cutting alloys, castings, refractories, abrasives and machine tools.

A list of exhibitors and their booth locations will be found on page 61.

W. B. COLEMAN
President, American Society for Steel Treating

Metal Treating Institute To Present NRA Code

COMMERCIAL metal treating companies and their representatives interested in aligning their interests with a code of fair competition under NRA may be interested in noting that an organization meeting of the Metal Treating institute, formed under temporary direction Aug. 18, will be held in the Ivory room of Hotel Statler the morning of Monday, Oct. 2. Permanent officers will be elected and the code for the industry presented for consideration and approval.

Temporary officers and other organization details were presented in the Aug. 28 issue of STEEL, p. 28. Present secretary is W. H. Eisenman, 7016 Euclid avenue, Cleveland, also secretary of the American Society for Steel Treating. C. U. Scott, president, C. U. Scott & Son, Rock Island, Ill., is temporary president.

Visits to 19 Detroit Industrial Plants Arranged

NATIONAL METAL CONGRESS visitors will have the opportunity to inspect many industrial plants in Detroit and vicinity. Nineteen plants are opening their doors and a schedule has been arranged to afford visits on four mornings and one afternoon. The schedule is as follows:

Tuesday Morning, Oct. 3

Bohn Aluminum & Brass Corp.—Visitors will be conducted through the forging plant, extrusion department, sand casting department and the valve and plumbing manufacturing department.

Chevrolet Motor Co.—This trip will cover the forge and gear and axle plants.

Great Lakes Steel Corp.; Michigan Steel Corp.—Both divisions of the National Steel Corp., will be visited in one trip. At the first will be seen the open hearths, and blooming, bar and strip mills; at the second, the manufacture of sheets.

Hudson Motor Car Co.—Heat treating, engine manufacturing and final test, gear and axle manufacture, body building and final assembly departments will be open for inspection.

Wednesday Morning, Oct. 4

Bower Roller Bearing Co.; Barnes-Gibson-Raymond Inc.—Both to be visited in one trip. Manufacture of roller bearings will be shown at the first; spring making will be seen at the second.

Detroit Edison Co., Delray Plant.—Equipment in this power house includes five steam boilers and four turbogenerators.

Chrysler Corp., Dodge Bros. Division.—Forging, heat treating, welding and assembly departments and engineering laboratories will be inspected. Those so choosing may visit the Plymouth plant nearby.

General Motors Research Laboratories.—Visitors will be shown through the chemical, fuels, engineering tests, dynamics, power plant, lighting, metallurgical, electrical, carburetor and special problems divisions.

Wednesday Afternoon, Oct. 4

Kelvinator Corp.—Manufacture of electric refrigerators will be seen in this plant.

Thursday Morning, Oct. 5

Ford Motor Co.—Departments open to visitors will be motor assembly, heat treating, welding, fabrication of stainless steel hub caps, and final assembly.

Timken-Detroit Axle Co.—Visitors will be conducted through the forge shop, heat treating, welding, chromium plating, pickling and gear manufacturing departments.

General Motors Proving Ground.—Passenger cars and trucks are tested under service conditions on these grounds at Milford, about 35 miles from Detroit.

Michigan Steel Casting Co.—This foundry produces steel castings. Departments to be visited include coremaking, molding, electric furnace melting, cleaning room and machine shop.

Friday Morning, Oct. 6

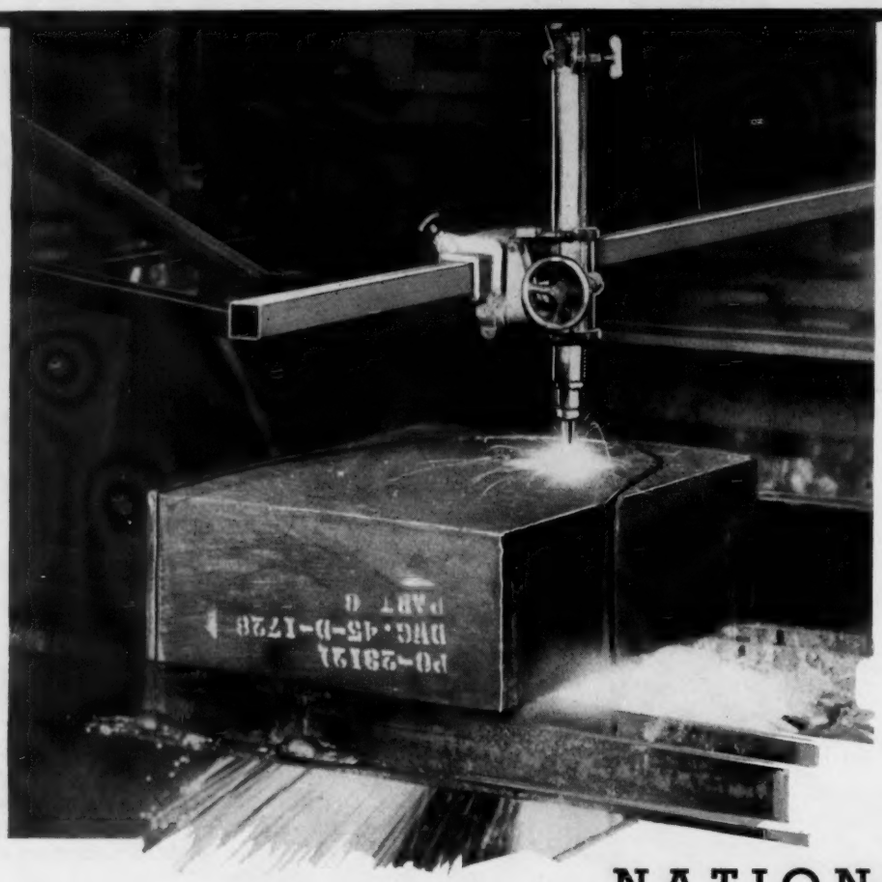
Climax Molybdenum Co.—Experimental laboratory equipment will be shown. The equipment includes induction melting furnaces, heat treating furnaces, machine shop, physical testing machines and photomicrographic, dilatometric and chemical apparatus.

Detroit Steel Corp.—This plant produces cold-rolled strip. Operations to be seen are pickling, cold rolling, annealing, slitting, cutting to length and flattening.

Detroit Seamless Tubes Co.—Manufacture of a diversified line of mechanical tubing for the automotive industry will be witnessed. Among the products are tie rods, drag links, cross members, axles, steering posts and oil tubes.

Whitman & Barnes Inc.—Visitors will see the manufacture and heat treatment of twist drills, reamers and cutters.

See these FLAME CUTTING MACHINES *in action*



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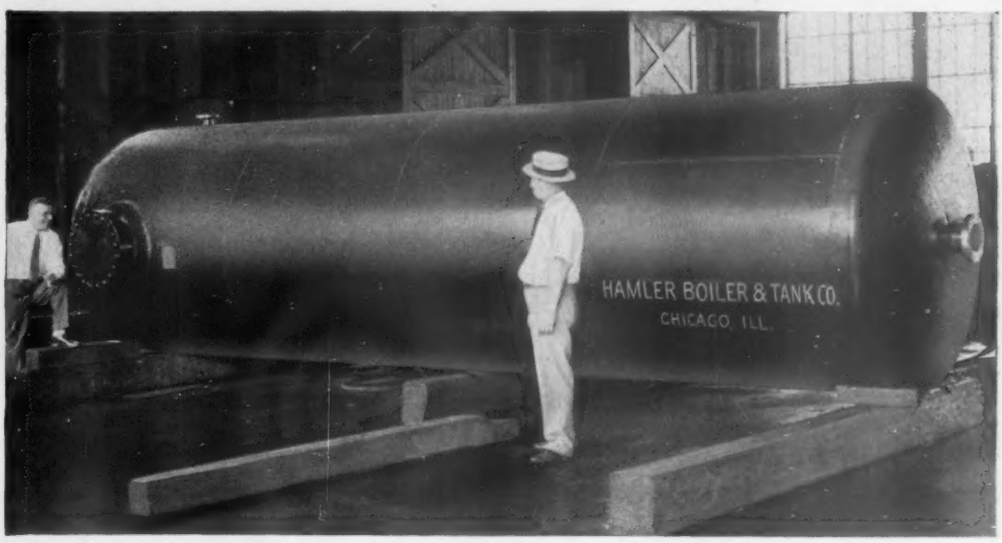
Another Industry turns to

INGOCLAD (Trade Mark Reg.)

STAINLESS-CLAD STEEL MADE BY THE INGERSOLL INGOT PATENTED PROCESS

The large Autoclave made entirely from IngOclad was recently fabricated by the Hamler Boiler & Tank Company, of Chicago, for one of the largest packing companies. This pressure vessel, handling a charge of 30,000 lbs., is 26 ft. long and 6 ft. in diameter, with walls $\frac{13}{16}$ inch thick, and heads of 1 inch thickness. The IngOclad used throughout provides a 20% thickness of 18-8 stainless steel on the interior of the vessel, giving the contents full stainless steel protection against corrosion and rust.



—Stainless cladding 13/64". | Mild Steel 51/64".

—A.S.M.E. Test Bar—actual dimensions taken from Autoclave head.

Protects your Product and Lowers Equipment Cost

IngOclad is an economy product designed to provide full stainless steel protection at much lower cost. Only the finest quality of stainless steel is used wherever working contact is made with your product. The use of stainless steel is thus brought within the investment range of all industries and all plants. Marked savings are not only made on the original equipment, but maintenance is much lower, better sanitation is insured, costly damages from rust and corrosion are eliminated, and your product is protected against discoloration and change of flavor, or odor.

Industry after industry is turning to IngOclad. Users and fabricators of products for the Food Industry, Chemical Industry, Soap Industry, Drug Industry, Paper Industry, Dairy Industry, Beer and Beverage Industries, etc., are especially invited to write for more specific information as to how IngOclad can serve them.

—Section of Test Bar showing butt-weld of stainless-clad plates. Stainless steel welding rods of 25% chromium and 12% nickel were used throughout.

—A.S.M.E. approved plate on Autoclave shown above.

INGERSOLL STEEL & DISC COMPANY

(A Division of Borg-Warner Corporation)

Specialists in High Carbon, Alloy and High Speed Steel and Stainless-Clad Sheets

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Plants: Chicago, Illinois, and New Castle, Indiana

To Discuss Role of Welding In Transportation Fields

CONTINUING a policy instituted seven years ago, the American Welding society has arranged its thirteenth annual fall meeting during National Metal week. Six technical sessions, comprising 31 prepared papers, will be held.

Facilities for registration, headquarters of the society and all technical sessions will be centered at the Book-Cadillac hotel.

As in past years the Tuesday afternoon session will be devoted to fundamental research in welding, under supervision of the research division of the society—the American Bureau of Welding.

Wednesday afternoon has been left open so that those interested may join in an inspection trip to the welding departments of several prominent automotive and accessory plants in the district.

The technical program is distinctive in that it features discussions showing the universal application of welding methods in various fields of transportation — railroad, aircraft, shipbuilding and automobile.

Details of the program are as follows:

Monday, Oct. 2

Registration—Facilities in Book-Cadillac hotel will be provided throughout the week from 9:30 a.m. to 5:00 p.m.

1:45 P. M.—BOOK-CADILLAC HOTEL

"Gas Cutting of Structural Steel." Author to be announced.

"Use of Shielded Carbon Arc in Class I Welding," by E. W. P. Smith, Lincoln Electric Co., Cleveland.

"Impact Values of Weld Metal," by J. C. Hodge, Babcock & Wilcox Co., Barberton, O.

"Building Up Pistons with Bronze," by T. W. Greene, development section, engineering department, Linde Air Products Co., New York.

6:30 P. M.—BOOK-CADILLAC HOTEL

Dinner meeting of board of directors.

Tuesday, Oct. 3

9:45 A. M.—BOOK-CADILLAC HOTEL

"Manufacture of Small Everdur Tanks by Welding," by Ira T. Hook, American Brass Co., Waterbury, Conn.

"Welding of Nonferrous Piping," by D. E. Roberts, sales engineer, Linde Air Products Co., New York.

"Welding of Nonferrous Metals and Alloy Steel," by representative of Thomson-Gibb Electric Welding Co., Bay City, Mich.

"Physical Properties of Welded Cast Steel," by Charles H. Jennings, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

"Welding of Inconel," by J. G. Schoener and F. G. Flocke, International Nickel Co., New York.

2:00 P. M.—BOOK-CADILLAC HOTEL

Fundamental Research in Welding

"Tensile Tests of Welded and Riveted Structural Members," by R. P. Davis and G. P. Boomsliter, West Virginia university, Morgantown, W. Va.

"Electric Arc Welding Under Water," by N. S. Hibshman, W. R. Harvey and C. D. Jensen, Lehigh university, Bethlehem, Pa.

"Effects of Motor Reactions in Electric Welding," by W. R. Woolrich and J. Tarboux, University of Tennessee, Knoxville, Tenn., and C. T. Raymo and W. B. Parker.

"Fatigue of Metals," by G. E. Thornton, State College of Washington, Pullman, Wash.

"Internal Stresses in Welds," by C. T. Schwarze, New York university, New York.

"Magnetic Characteristics of Deposited Metal," by Wendell F. Hess, Rensselaer Polytechnic institute, Troy, N. Y.

"Stress Distribution on Welded Connections," by S. C. Hollister, professor of structural engineering, Purdue university, Lafayette, Ind.

7:30 P. M.—BOOK-CADILLAC HOTEL

Conference and meeting of Fundamental Research Committee, American Bureau of Welding. H. M. Hobart, chairman, presiding. This conference is scheduled for the benefit of university research workers in the fundamentals of welding.

Wednesday, Oct. 4

9:45 A. M.—BOOK-CADILLAC HOTEL

Resistance Welding Session

"Automatic Controls for Electric Welding," by H. W. Roth, Controloweld Inc.

"Controlled Welding," by O. C. Frederick, General Electric Co., Schenectady, N. Y.

"Precision Spot Welding with Tube Controlled Contactors," by C. Stansbury, Cutler-Hammer Inc., Milwaukee.

"Timing of Spot Welders with Reference to Current Flow," by D. C. Wright, Electric Controller & Mfg. Co., Cleveland.

1:15 P. M.—BOOK-CADILLAC HOTEL

Plant Visitation, arranged by the Detroit Section, to include welding departments of Kelsey Hayes Wheel Corp., Ford Motor Co., and an automobile body plant.

Thursday, Oct. 5

9:45 A. M.—BOOK-CADILLAC HOTEL

"Shipbuilding Welding," by G. H. Moore Jr., Newport News Shipbuilding & Dry Dock Co., Newport News, Va.

"Welding of Structural Nickel Steel," by W L. Warner, Watertown Arsenal, Watertown, Mass.

"Welding of Galvanized Steel," by Leon C. Bibber, bureau of construction and repair, navy department, Washington.

"An Aircraft Manufacturer's Experience with Welding Quality Control," by T. H. Speller and P. N. Jansen, Curtiss Aeroplane & Motor Co. Inc., Buffalo.

2:00 P. M.—BOOK-CADILLAC HOTEL

"Shop Setup for Pre-Fabrication of Welded Machinery," by Mr. Kondal, Wickes Boiler Co.

"Modern Rail Welding Without Interrupting Traffic," by J. H. Deppeler, Metal & Thermit Corp., New York.

"Pressure Regulators and Regulation Problems," by George M. Deming, Air Reduction Sales Co., New York.

"Automobile Welding." Author to be announced.

"The Oxyacetylene Process in the Automotive Industries," by G. B. Purcell, G. B. Purcell Welding Shop.

"Welding as an Aid to Modernization of Breweries," by D. S. Lloyd, Dominion Oxygen Co. of Canada.

"Welding in the Automotive Industry," by C. A. Bowlus, development engineer, Welding Sales & Engineering Co., New York.

"Limitations of X-Ray Inspection," by Col. A. S. Douglass, construction engineer, Detroit Edison Co., Detroit.

7:00 P. M.—BOOK-CADILLAC HOTEL

Annual banquet and dance.

F. P. McKIBBEN

President, American Welding Society

STEEL at the Metal Show

THROUGHOUT the National Metal exposition STEEL will maintain headquarters in Booth 36, which will be outfitted as a restroom for the convenience of visitors. Publications of the Penton Publishing Co., including STEEL, *Daily Metal Trade*, *The Foundry*, *Abrasive Industry* and *Automotive Abstracts;* and *Machine Design*, published by the Johnson Publishing Co., will be available here. Representatives in attendance will be: E. L. Shaner, editor; G. O. Hays, business manager; E. F. Ross, associate editor; J. D. Knox, associate editor; A. H. Allen, associate editor; L. C. Pelott, Chicago manager; S. H. Jasper, Pittsburgh manager; John Henry, business representative; R. C. Jaenke, business representative; D. C. Kiefer, business representative; J. D. Pease, vice president, Penton Publishing Co., and H. B. Veith, editorial representative, *Machine Design*.

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Sizes in stock from .075 to 3/16"

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Chromium 28%

Chromium 18% and Nickel 8% Carbon under .07 with titanium

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Chromium 18% and Nickel 8% Molybdenum 2½%, Carbon under .07

Chromium 24% and Nickel 12%

Chromium 29% and Nickel 9%

Chromium 15% and Nickel 35%

Chromium 15% and Nickel 60%

Chromium 20% and Nickel 80%

Chromium 25% and Nickel 18% Silicon 2½%

Chromium 20% and Nickel 25% Silicon 2½%

Maurath Processed Electrodes are produced to meet any requirements and give an exact analysis without loss of elements or the addition of injurious inclusions.

Maurath, Inc. is the oldest company producing Alloy Electrodes exclusively. If you weld stainless alloys it will pay you to write for further information.

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See me at the National Metal Congress for first hand information on welding of Stainless and Heat-Resisting Alloys.

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A.I.M.E. Divisions To Study Current Metal Problems

TWO divisions of the American Institute of Mining and Metallurgical Engineers—the Institute of Metals and Iron and Steel—will hold meetings Wednesday and Thursday, Oct. 4 and 5, of National Metal week, at Hotel Statler.

Sessions will open with a joint meeting of the two divisions Wednesday at 2:00 p.m., two technical papers being scheduled. Later, at 6:30 p.m., a joint dinner is planned, at which A. B. Kinzel, Union Carbide & Carbon Research Laboratories, Long Island City, N. Y., will speak on "Silicon."

—Blank & Stoller Inc.

JOHN JOHNSTON

Chairman, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers

Thursday morning at 9:30 the Institute of Metals will convene for a roundtable discussion of nonferrous metals used by the automobile industry, while simultaneously the Iron and Steel division will hear three technical papers devoted to alloy steel and gases in metals.

Executive committees of the divisions will hold luncheons at noon. The concluding technical session will convene at 2 p.m., when three papers dealing with nonferrous metals will be heard by the Institute of Metals

This will be followed by a meeting of a subcommittee and advisory council on the terminology of impurities in metals, which is open to all interested.

Activities of the two divisions will be lead by their chairmen: Truman S. Fuller, metallurgist, research laboratories, General Electric Co., Schenectady, N. Y., of the Institute of Metals; and Dr. John Johnston, director of research laboratories, United States Steel Corp., Kearny, N. J., of the Iron and Steel division.

Detailed technical program for the divisions is as follows:

Wednesday, Oct. 4

2:00 P. M.—HOTEL STATLER

Joint Session of Iron and Steel and Institute of Metals Divisions

"Relation Between the Plastic Deformation in Deep Drawing and the Tensile Properties of Various Materials," by M. H. Sommer.

"Studies on Creep of Metals Using a Modified Rohn Test," by C. R. Austin and J. R. Gier.

6:30 P. M.—HOTEL STATLER

Joint Dinner of Iron and Steel and Institute of Metals Divisions. Speaker: A. B. Kinzel, Union Carbide & Carbon Research Laboratories, Long Island City, N. Y., on the subject of "Silicon."

Thursday, Oct. 5

9:30 A. M.—HOTEL STATLER

Institute of Metals Division

Roundtable on "Nonferrous Metals in the Automotive Industry."

1. Economies resulting from the use of nonferrous metals in automotive parts.
2. Economies resulting from the use of nonferrous cutting tools. Discussion by Dr. Zay Jeffries, who has worked extensively of late with tungsten and tungsten carbides.
3. The automotive uses of alloys possessing special expansion characteristics. Discussion by Robert G. Waltenberg, metallurgist, H. A. Wilson Co., Newark, N. J., who is a recognized authority on special expansion alloys and their uses.
4. Bearings, including solid, bronze, and steel-backed and bearings made from pressed metal powders.
5. Finishing nonferrous automotive parts.

10:00 A. M.—HOTEL STATLER

Iron and Steel Division

"X-Ray Study of the Diffusion of Chromium Into Iron," by Lawrence C. Hicks.

"Titanium and Columbium in Plain High-Chromium Steel," by F. M. Becket and Russell Franks, Electro Metallurgical Co., New York.

"Improvements in Vacuum Fusion Method for Determination of Gases in Metals," by Lewis Reeve.

12:00 M.—HOTEL STATLER

Executive committee luncheon, Institute of Metals Division.

Executive committee luncheon, Iron and Steel Division.

2:00 P. M.—HOTEL STATLER

Institute of Metals Division

"Notes on the Cadmium-Nickel System," by C. E. Swartz and Albert J. Phillips, American Smelting & Refining Co., Maurer, N. J.

"Copper Embrittlement—III," by L. L. Wyman, General Electric Co., Schenectady, N. Y.

"A Table of the Rapid Interconversion of Atomic and Weight Percentages," by Cyril S. Smith, American Brass Co., Waterbury, Conn.

Meeting of subcommittee and advisory council on the "Terminology of Impurities in Metals." Open to all interested.

A.S.M.E. Session On Shop Methods

WEDNESDAY, Oct. 4, will mark participation of the American Society of Mechanical Engineers in the National Metal congress. Under sponsorship of the Detroit section of the society, a one-day meeting has been arranged with two papers scheduled for presentation.

T. S. FULLER

Chairman, Institute of Metals Division, American Institute of Mining and Metallurgical Engineers

"Characteristics and Methods of Test of Automotive Brake Drums." by C. L. Eksergian, Budd Wheel Co., Detroit, is the first of these two discussions, to be followed by "Simplicity—the Solution of Extreme Accuracy in Quantity Production," by Gordon M. Evans, Kelvinator Corp., Detroit. Meeting will be at 9:30 a.m. in the Henry II room of Hotel Statler. Chairman of the meeting is A. N. Goddard, Goddard & Goddard Co., manufacturer of milling machine cutters, Detroit.

After the meeting a luncheon will be held at the plant of the Kelvinator Corp., 14250 Plymouth road, followed by motion pictures and an inspection trip through the plant.

ADVERTISING PAGES REMOVED

Sessions of Wire Association Will Feature Manufacturing Technique

OF TIMELY interest to wire mill production engineers and executives will be a technical session of the Wire association devoted to the general subject of the effect of NRA on production costs and operating schedules. The association, for the second successive year, is holding its annual meeting during the National Metal congress, with sessions at the Book-Cadillac hotel.

Meetings will open Tuesday morning, Oct 3, and continue through Thursday morning, Oct. 5, comprising three technical sessions and the annual business meeting. John Mordica, superintendent, rod and wire mills, Bethlehem Steel Co., Sparrows Point, Md., and president of the Wire association, will be in charge of the annual business meeting.

Following customary policy of concentrating upon open discussion at technical sessions with one exception only a single formal paper has been planned for each session. Balance of the time will be available for exchange of ideas among those present and general discussion of wire drawing problems.

To further this policy the association has drawn up a series of pertinent questions which will be advanced for open discussion.

JOHN MORDICA
President, Wire Association

Technical sessions will cover current practice in the drawing of both steel and nonferrous metal wire. Detailed program, as announced by the association, is as follows:

Tuesday, Oct. 3

9:30 A. M.—Book Cadillac Hotel

Dies, Lubricants, Inhibitors and Lime

"Sizing and Resizing Carbide and Diamond Dies for Copper Wire Drawing," by J. J. Kehoe, designing engineer, and F. D. Ruhl, process engineering department, General Electric Co., Schenectady, N. Y.

"Inhibitors," by F. P. Spruance, sales manager, American Chemical Paint Co., Ambler, Pa.

Wednesday, Oct. 4

9:30 A. M.—Book Cadillac Hotel

Effect of NRA on Production Costs and Operating Schedules

"Teamwork in Industry" by First Lieut. Frank W. Bullock, United States army, research student at Harvard School of Business Administration.

2:30 P. M.—Book Cadillac Hotel

Annual meeting of Wire association. President John Mordica, superintendent rod and wire mills, Bethlehem Steel Co., Sparrows Point, Md., presiding. Financial report, plans for 1934 meeting and committee reports.

Thursday, Oct. 5

9:30 A. M.—Book Cadillac Hotel

Nonferrous Session

"Copper Alloy Wire," by James T. Kemp, service engineer, American Brass Co., Waterbury, Conn.

Exhibitors in National Metal Exposition

Convention Hall, Detroit, Oct. 2-6

Exposition Hours

Monday ..... **12:00 to 10:00 p.m.**
Tuesday ..... **12:00 to 10:00 p.m.**
Wednesday ..... **12:00 to 10:00 p.m.**
Thursday ..... **12:00 to 6:00 p.m.**
Friday ..... **12:00 to 10:00 p.m.**

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Ajax Electric Co., Philadelphia 150
Ajax Electrothermic Corp., Trenton, N. J. 150
Allegheny Steel Co., Brackenridge, Pa. 171
Allen, Edgar, Steel Co. Inc. 104
American Brass Co., Waterbury, Conn. 38
American Car & Foundry Co., New York 52
American Cyanamid & Chemical Corp., New York 65
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(*Please turn to page* 64)

Cut Chipping Costs

Save Re-melt Losses

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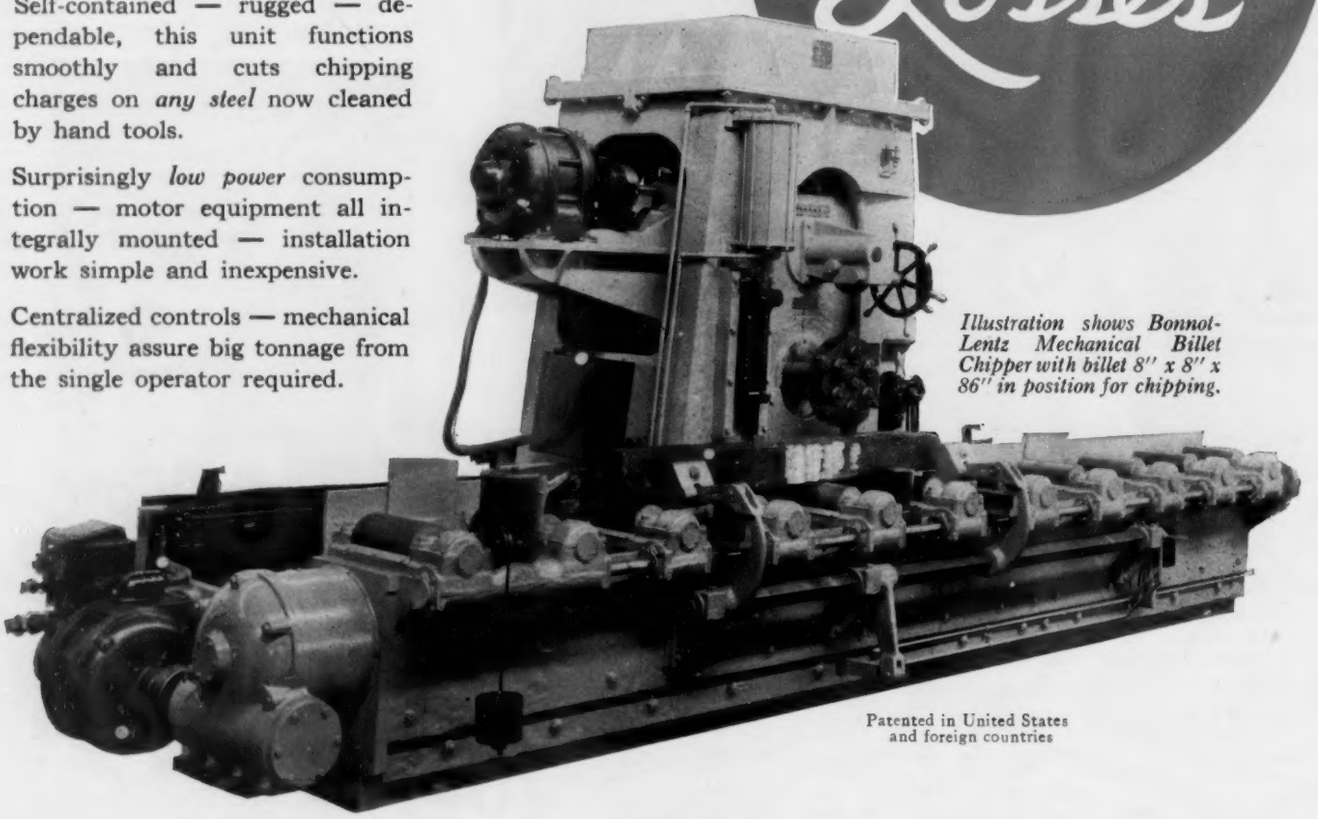

Illustration shows Bonnot-Lentz Mechanical Billet Chipper with billet 8" x 8" x 86" in position for chipping.

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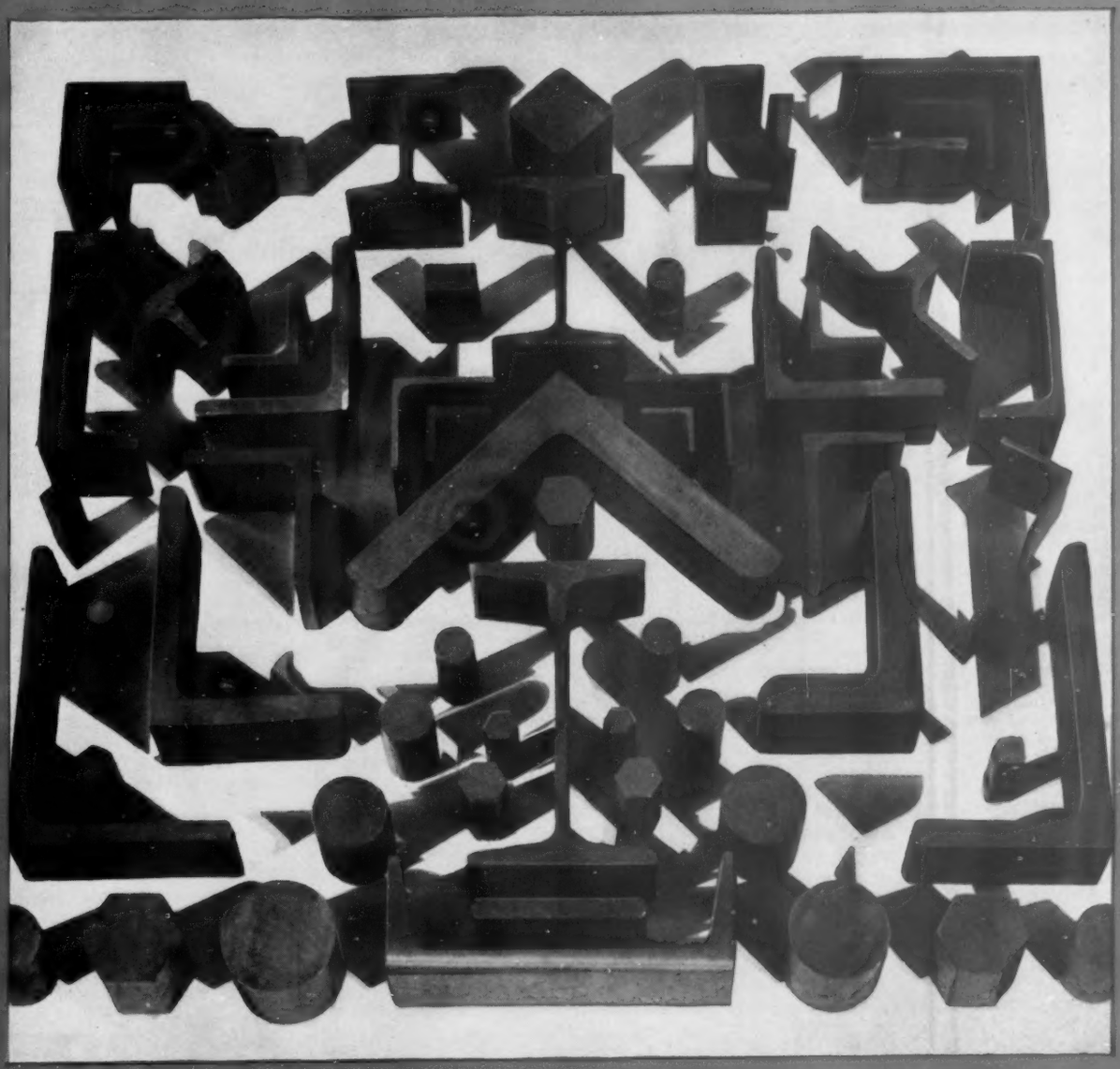
Steel Equipment Division

BARS AND SHAPES



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Y

Youngstown Sheet & Tube Co., Youngstown 54

Z

Ziv Steel & Wire Co., Chicago 20A

Detroit's famous Convention Hall which will house the **1933** *National Metal exposition. This hall, occupying a good portion of a city block between Cass and Woodward avenues, south of Forest street, has* **166,000** *square feet of exhibit space*

ADVERTISING PAGES REMOVED

Analysis of Factors Influencing

Rolling Pressure and Power Consumption In the Hot Rolling of Steel

BY SVEN EKELUND

Translated by BENGT BLOMQUIST

Part III—External Friction

(Sixth Article of Series)

EXTERNAL friction in the surfaces, which work upon the material, has a great influence upon the deformation as well as upon the pressure required to carry out the deformation. As shown, the frictional forces in the roll surfaces are directed opposite to each other. From this it follows that a pressure must be applied which is greater than the corresponding value for the strength of the material, if the friction shall be overcome and the deformation carried out. This increase in pressure is transmitted in all directions within the body, as it is in a fluid of which the surface is subjected to pressure. As already shown, the forward slip and the gripping angle are determined by the friction, which also governs the spreading of the material, both with regard to magnitude and to distribution. The friction is not the same laterally as longitudinally on the roll surface, and each case will have to be dealt with separately. The conditions may be compared with the frictional forces on an inclined plane. The resistance, which has to be overcome in the horizontal direction, is greater in the direction of rolling than in the opposite direction.

A section through a rectangular bar is shown in Fig. 14. The co-ordinate from one side toward the middle line is y, and the height of the section is h. The increase in pressure p_y, at a certain point y, which is required to overcome the resistance m in the pressure surface, will be:

$$p_y = \frac{2m_1}{h} \quad \text{.....(31);}$$

where m_1 is the resistance on opposite pressure surfaces, and p_y is measured from the side to the point in question.

Since m depends upon y_1, p_y and also the pressure $p + p_y$ will be a function of y. It is evident that p must be a factor in this function, because the coefficient of friction μ, for dry friction and little relative velocity, is practically independent of p; so that the resistance will be directly proportional to the pressure at each point.

$$p + p_y = p \cdot f(y) \; ; \; p_y = p[f(y) - 1]$$

According to equation (31):

$$p[f(y) - 1] = \frac{2}{h}\int_0^y \mu \cdot p \cdot f(y)\,dy$$

Differentiation of this equation gives:

$$f'(y) = \frac{2\mu}{h} f(y)$$

This equation is satisfied by:

$$f(y) = e^{\frac{2\mu y}{h}} + c$$

$$p_y = p\left(e^{\frac{2\mu y}{h}} + c - 1\right);$$

$$y = 0,\ p_y = 0,\ c = 0$$

$$p_y = p\left(e^{\frac{2\mu y}{h}} - 1\right) \quad \text{.....(32)}$$

p_y expresses the increase in pressure which will overcome the external friction and allow the material to be deformed under the pressure p. However, there is also a possibility that a movement in the material, in a direction opposite to the forces of friction, will take place by shearing directly underneath the contact surface. The pressure required for shear is:

$$p_{y_1} = \frac{2yt}{h} \quad \text{.....(33).}$$

The mean value between o and y is:

$$p_{y_1 m} = \frac{1}{2} p_{y_1} = \frac{yt}{h} = \frac{b\sigma}{4h} \quad \text{.....(33a);}$$

and the total surface pressure is:

$$p_s = p + \frac{b\sigma}{4h} \quad \text{.....(33b).}$$

Thus, slip or shear, respectively, will occur when:

$$p\left(e^{\frac{2\mu y}{h}} - 1\right) \gtrless \frac{2yt}{h}$$

If the velocity effect is disregarded,

$$p = \sigma = 2t$$

so that:

$$e^{\frac{2\mu y}{h}} \gtrless \frac{y}{h}$$

If different values for y/h and μ are substituted, it will be found that no slippage occurs for $\mu \gtrsim 0.5$, and that the resistance to shear seldom exceeds that of slippage for $\mu = 0.30$-0.50.

If both sides are integrated with respect to y, a comparison between the two summations will be obtained:

$$\int_o^y \left(e^{\frac{2\mu y}{h}} - 1\right) dy \gtrless \int_o^y \frac{y}{h}\,dy$$

$$\frac{h}{2\mu}\left(e^{\frac{2\mu y}{h}} - 1\right) - y \gtrless \frac{y^2}{2h}$$

$$\frac{1}{2\mu}\left(e^{\frac{2\mu y}{h}} - 1\right) - \frac{y}{h} \gtrless 2\left(\frac{y}{h}\right)^2$$

This comparison gives the same results that were obtained earlier.

When slippage occurs, the mean value of the resistance between o and y is:

$$p_{y_m} = \frac{p\hbar}{2\mu y}\left(e^{\frac{2\mu y}{h}} - 1\right) - p$$

and the total pressure required will average:

$$p_{s_1} = p + p_{y_m} = \frac{p\hbar}{2\mu y}\left(e^{\frac{2\mu y}{h}} - 1\right) \quad (34).$$

Equation (34) has been checked against a few test values taken from an investigation by Bach (Zeits. d. Ver. d. Ing. 1885, p. 629). In these tests the yield point p_{s_1} was determined for lead cylinders of different heights. The results obtained by Bach are tabulated in Table VIII.

The co-efficient of friction between lead and steel has been determined as 0.20.

From equation (34), it follows that:

$$p = \frac{\mu d}{h} \cdot \frac{p_{s_1}}{e^{\frac{\mu d}{h}} - 1}$$

For examples 1 to 4, p assumes the following values:

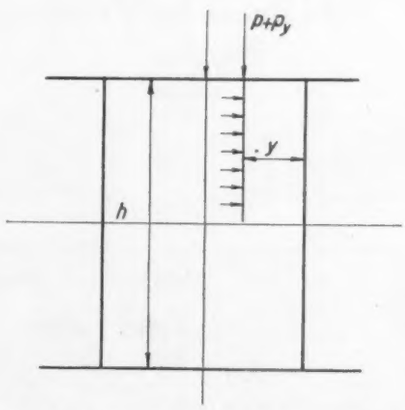


Fig. 14—Distribution of pressure required for overcoming external frictional resistance during deformation

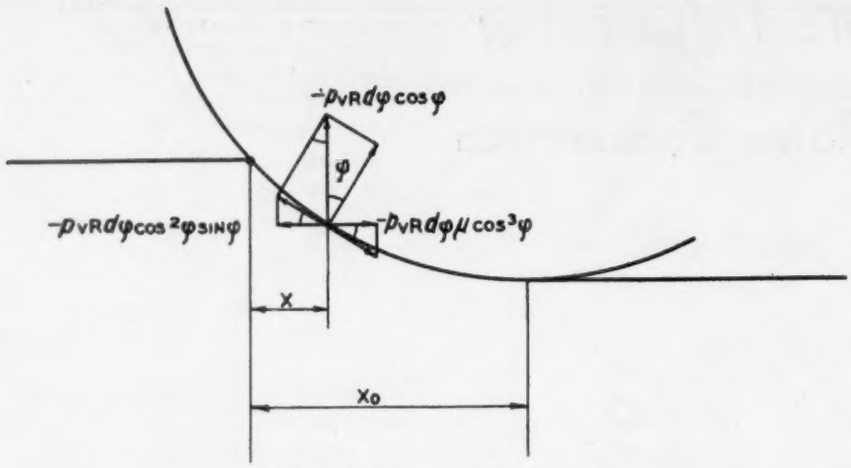


Fig. 15—Distribution of forces on the roll surface

p = 695, 890, 1240, 630 pounds per square inch.

According to equation (29a), and after substitution of the mean values $1 = b = \frac{\pi d}{4}$ and $n = n_1 = 2$:

$$p = \sigma = 1.26t, 1.75t, 2.06t, 1.40t$$

If 1.26 t equals 695 pounds per square inch, the corresponding values will be as shown in Table IX.

This shows that in reality a still more distinct maximum occurs at $\frac{nh}{l}$ or $\frac{nh}{b} = 1$ than is indicated by equation (29a). However, the results prove that the formulas are correct in principle.

Along the roll surface in the direction of rolling, the frictional conditions are somewhat more complicated. In Fig. 15 the forces acting on the element $Rd\phi$ are shown. The vertical pressure $-p_v \cdot Rd\phi \cdot \cos\phi$ has one component in the radial direction which is equal to $-p_v \cdot Rd\phi \cdot \cos^2\phi$ and another component in the tangential direction which is equal to $-p_v \cdot Rd\phi \cdot \cos\phi \cdot \sin\phi$. In order that slippage may occur opposite to the direction of rolling, the resistance in the horizontal direction, which is equal to

$$-(p_v \cdot Rd\phi \cdot \cos^2\phi \cdot \mu \cdot \cos\phi - p_v \cdot Rd\phi \cdot \cos\phi \cdot \sin\phi \cdot \cos\phi)$$

must be overcome. The horizontal coordinate, measured from the angle of contact ϕ_1 is $x = R(\sin\phi_1 - \sin\phi)$. Then $dx = -R\cos\phi \cdot d\phi$. In order to simplify the computation, an approximation may be introduced, as follows:

$$\mu \cos^2\phi - \sin\phi \cdot \cos\phi = k_1 x + k_2$$

where k_1 and k_2 are constants which can be determined from the limiting values.

The total pressure is $p_v = p \cdot f(x)$. The resistance pressure is:

$$p_x = p_v - p = p[f(x) - 1]$$

p_x acts on a variable height, but for the sake of simplicity assume that it acts on the mean height $\frac{1}{2}(h_1 + h_2)$, which can be written as the constant $2K_3$. Thus:

$$p[f(x) - 1]K_3 = \int_0^x p \cdot f(x) \cdot (k_1 x + k_2)\,dx$$

$$K_3 \cdot f'(x) = f(x) \cdot (k_1 x + k_2)$$

Substituting $f(x) = u$, so that $f'(x) = \frac{du}{dx}$, we obtain:

$$\frac{du}{u} = \frac{1}{K_3}(k_1 x + k_2)\,dx;\ \log_e u = \frac{1}{K_3}\left(\frac{k_1 x^2}{2} + k_2 x\right) + c$$

$$x = o,\ u = o,\ \therefore c = o$$

$$u = f(x) = e^{\frac{k_1 x^2}{2K_3} + \frac{k_2 x}{K_3}} = e^{c_1 x^2 + c_2 x}$$

$$p_v = p \cdot f(x) = p \cdot e^{c_1 x^2 + c_2 x} \quad \text{.....(35)}$$

$$p_x = p\left(e^{c_1 x^2 + c_2 x} - 1\right) \quad \text{.....(36)}$$

Without introducing any greater error, p_x can be written as:

$$p_x = \frac{4}{3} p(c_1 x^2 + c_2 x) \quad \text{.....(36a).}$$

For $x = o$ and $\phi = \phi_1$ Then $x = R \cdot \sin\phi_1 = x_0$ and $\phi = o$. We obtain:

$$k_1 = \frac{\mu \cdot \sin\phi_1 + \cos\phi_1}{R}$$

$$k_2 = \mu \cdot \cos^2\phi_1 - \sin\phi_1 \cdot \cos\phi_1$$

$$k_3 = \frac{h_1 + h_2}{4}$$

Then

$$c_1 = \frac{k_1}{2k_3} = \frac{2(\mu \cdot \sin\phi_1 + \cos\phi_1)}{R(h_1 + h_2)}$$

$$c_2 = \frac{k_2}{k_3} = 4\,\frac{\mu \cdot \cos^2\phi_1 - \sin\phi_1 \cdot \cos\phi_1}{h_1 + h_2}$$

Slippage or shear, respectively, occur when:

$$2t \cdot \frac{4}{3}(c_1 x^3 + c_2 x) \gtrless 2t\,\frac{x}{h}$$

It will be found that slippage always takes place in the region between ϕ_1 and ψ. From ψ to 0, where the material moves ahead of the roll, slippage cannot occur, but the material is sheared forward as in the lateral case. The "resistance pressure" within this region then will have to be calculated from the delivery height h_x. The position of ψ is determined by the stipulation that the resistance to forward movement must equal the resistance to backward movement, which is equivalent to saying that the respective resistance pressures are equal at this point. Then:

$\phi = \psi$; $x = x\psi$, then:

$$p_x = 2t \cdot \frac{4}{3}(c_1 x^2 \psi + c_2 x\psi) = 2t\,\frac{x_0 - x\psi}{h_2} = p_{x_1}$$

$$x\psi = -\frac{c_2 + \frac{0.75}{h_2}}{2c_1} + \sqrt{\left(\frac{c_2 + \frac{0.75}{h_2}}{2c_1}\right)^2 + 0.75\,\frac{x_0}{c_1 h_2}} \quad (37)$$

According to the approximate formula (3), $x\psi$ is:

$$x\psi = x_0 - R \cdot \sin\psi = x_0 - \frac{R}{2\sin\alpha}[\cos(\alpha - \phi_1) - \cos\alpha] \quad .(37a)$$

If these two formulas are tested for the same values, they prove to check well. In general,

$$x\psi = \frac{2}{3}x_0 \text{ to } \frac{7}{12}x_0$$

The mean value of p_x for the total surface of contact is:

$$p_{xm} = \frac{1}{x_0}\left[p \cdot \int_0^{2/3x} \left(\frac{4}{3}c_1 x^2 + \frac{4}{3}c_2 x\right)dx + p\int_{2/3x_0}^{x_0} \frac{x_0 - x}{h_2}\,dx\right]$$

Table VIII

Yield Points for Various Heights

Test No.	Height, inches	Diameter, inches	Yield point, lbs./sq. in.
1	2.76	1.38	735
2	1.37	1.38	985
3	0.40	1.37	1800
4	0.60	6.33	2140

Table IX

Yield Points for Various Tests

	Test No. 1	2	3	4
p—pounds/square inch				
from equation (34)	695	890	1240	630
from equation (29a)	695	960	1135	770
Difference	0	—70	105	—140

Table X

Measured and Calculated Values of Forward Slip

D, inches	h_1, inches	h_2, inches	b, inches	a, inches	s, inches	t, deg. Fahr.	μ	ψ	f measured	f calculated
23.38	5.118	4.528	3.937	103.149	101.378	2038	0.5	.087	1.75	1.62
24.21	7.874	7.087	7.874	176.544	174.212	1858	0.6	.097	1.35	1.15
13.62	0.472	0.354	1.969	457.676	431.192	2038	0.5	.057	6.17	6.35
28.27	1.969	1.476	8.858	234.252	224.409	2002	0.5	.067	4.38	4.10
28.27	1.969	1.476	8.858	236.220	224.212	1678	0.6	.080	5.38	5.80
28.27	1.00	0.430	9.055	236.220	212.008	1678	0.6	.073	11.42	11.80
28.27	0.630	0.433	9.055	236.220	216.141	1498	0.65	.055	9.30	9.80

$$= p\left(c_1 \cdot \frac{32}{243} x_0^2 + c_2 \cdot \frac{8}{27} + x_0 \frac{1}{18 h_2} x_0\right) \quad \text{.....(38)}$$

This expression, with a slight approximation, can be written as:

$$p_{xm} = 0.8p\left[c_1 \left(\frac{x_0}{2}\right)^2 + c_2 \frac{x_0}{2}\right] \text{(38a)};$$

and when c_1, c_2, and x_0 are expressed in their proper symbols, the relation becomes:

$$p_{xm} = p \frac{1.6\mu\sqrt{R(h_1 - h_2)} - 1.2(h_1 - h_2)}{h_1 + h_2}$$

$$= p : m \quad \text{.....(38b)}.$$

The mean value of the pressure required for longitudinal deformation is:

$$p_v = p_{xm} + p = p(1 + m) \text{.....(39)}.$$

Forward Slip

Inasmuch as equation (37a) checks with equation (37), it can be anticipated that equation (4a) for the forward slip should be accurate, so that:

$$f = \frac{\psi^2}{2}\left(\frac{D}{h^2} - 1\right) \cdot 100\% \text{..... (4a)}.$$

In order to check the validity of this formula, the forward slip was measured in a number of cases according to the following method: On the delivery side of a slabbing mill, two marks were made several feet apart on the runout table, and the exact distance between them was measured. While the front end of the slab traveled this distance, the corresponding length of roll periphery was measured by means of a revolution counter which was held against the roll. It was possible to carry out this measurement with accuracy, because the rolling speed was chosen low, and the ends of the measured distance were marked with pieces of plate which were pushed down by the slab. The temperature was observed in each case. The revolution counter made 21 revolutions for each 79 inches of distance. Table X is a compilation of the test data, giving the measured distance a, the length of the roll periphery s, the temperature t, the coefficient of friction μ, the angle ψ, and measured and calculated values of the forward slip. D represents the roll diameter, h_1 and h_2 the thickness of the slab before and after the pass, and b the width of the slab.

Calculated Values Differ

The forward slip calculated according to this formula for values from Puppe's investigation (*Stahl und Eisen*, 1909, p. 161) does not check so well, especially at high temperature, where the formula gives higher values. In Puppe's tests, a groove had been cut in the roll which left elevated marks on the surface of the bar, between which the distance was measured. It is possible that this groove caused the equilibrium to be disturbed. It is true that the forward slip becomes less at higher temperature, because the friction decreases, but there is no reason to assume that it should become equal to zero at a certain temperature. It is hardly possible to illustrate the forward slip graphically because it depends upon so many factors.

Spreading

To calculate the amount of spreading which takes place in a certain case, the following factors should be considered: the linear reduction and the outer resistances on the surface of contact. These factors solely determine the magnitude of spreading.

An equation can be set up to express the relation that the work per unit of "free surface" of the bar in the region of contact, which is required to overcome the external resistances, is equally great longitudinally and laterally. If the influence of velocity and the variation of strength are neglected, as in equation (29a), this relation can be written as:

$$t \cdot \frac{b}{2h} \cdot db = p \cdot \frac{b}{4h} db = p \cdot m \cdot dl$$

$$b \cdot db = 4m \cdot h \cdot dl$$

$$l = x_0 = \sqrt{R(h_1 - h_2)}$$

$$\frac{dl}{x_0} = \frac{dh}{h} = \frac{db}{b}$$

$$b \cdot db = 4m \cdot x_0 \cdot dh - 4m \cdot h \cdot x_0 \cdot \frac{db}{b}$$

For the sake of simplicity, we may write: $h = \frac{h_1 + h_2}{2}$. After integration between b_2 and b_1 and between h_1 and h_2, we obtain:

$$b_2^2 - b_1^2 = 4mx_0(h_1 - h_2) - 2m(h_1 + h_2) \cdot x_0 \cdot \log_e \frac{b_2}{b_1}$$

Inasmuch as $\frac{b_2}{b_1}$ in most cases never exceeds 1.2, we can write:

$$\log_e(b_2/b_1) = \frac{b_2}{b_1} - 1.$$

This approximation, when introduced into the equation, gives:

$$b_2 = -2m(h_1 + h_2)\frac{x_0}{b_1} + \sqrt{4m^2(h_1 + h_2)^2\left(\frac{x_0}{b}\right)^2 + 4mx_0(3h_1 - h_2)} \quad \text{.....(40a)}.$$

Table XI

Measured and Calculated Values of Spread

Test No.	h_1, inches	h_2, inches	b_1, inches	x_0, inches	μ	m	b_2—inches max.	b_2—inches mean	b_2—inches calc.	$\frac{dl}{x_0} \div \frac{dh}{h}$
1	4.410	3.071	9.173	4.370	0.6	0.30	9.803	9.685	9.764	0.82
2	9.173	8.189	4.412	3.740	0.6	0.15	4.685	4.567	4.685	0.51
3	4.272	2.284	4.272	5.197	0.5	0.28	5.669	5.217	5.433	0.54
4	4.272	2.717	4.272	4.252	0.5	0.27	5.197	4.961	5.118	0.57
5	4.272	3.150	4.272	3.976	0.5	0.25	4.882	4.725	4.802	0.58

From equation (40) we also obtain:

$$\frac{dl}{x_o} \div \frac{db}{b} = \frac{b^2}{1m \cdot h \cdot x_o} = \frac{(b_1+b_2)^2}{8m(h_1+h_2)x_o}$$

as well as

$$\frac{dl}{x_o} \div \frac{dh}{h} = \frac{1}{n} =$$

$$\frac{(b_1+b_2)^2}{8m(h_1+h_2)x_o+(b_1+b_2)^2} \quad \ldots\ldots (41).$$

The last two expressions represent the ratio of elongation to spread and the ratio of elongation to linear reduction, the latter of which can be called the "elongation ratio." If all the material were elongated so that no spreading would occur, the elongation ratio would be 1. As can be seen, this never is possible; but the ratio will approach more closely to a value of 1, the smaller the term $8m(h_1+h_2) \cdot x_o$ is in relation to $(b_1+b_2)^2$; that is, the smaller the linear reduction is (smaller m and x_o), and the smaller the thickness (h_1 and h_2) is in comparison to the width (b). This conclusion is verified by experience.

The formula has been applied to the rolling tests previously described, in which the maximum width $b_{2\,max.}$ and mean width $b_{2\,mean.}$ of the blanks were determined. The results are compiled in Table XI.

The calculated widths check closely with the measured values. The elongation ratio is most advantageous in test 1, where the elongation is about four times as great as the spreading. In test 2, almost half of the material goes into spreading, while in tests 3 to 5 the elongation is somewhat greater.

In blooming mills where ingots are broken down, 40 to 50 per cent of the work of rolling could be saved if the spreading could be hindered. This, however, cannot be done unless vertical rolls are applied to the sides of the ingot, which would require for each pass a separate stand of four rolls, two being horizontal and two vertical in the same plane. As has previously been shown, the resistance of the material will be less for deformation in one direction only, which also would reduce the rolling work.

(To be Continued)

New Boiler Arranged for Combination Firing of Pulverized Coal and Gas

AN INSTALLATION of a Stirling boiler with a Bailey water-cooled furnace, having a new arrangement with burners for combination firing of blast furnace gas and pulverized coal has recently been made in a large steel plant by the Babcock & Wilcox Co., New York.

The new unit, it is said, has lower operating costs through better combustion in the furnace and a reduction in the maintenance on the furnace, the latter being particularly true when the fuel burned is largely coal.

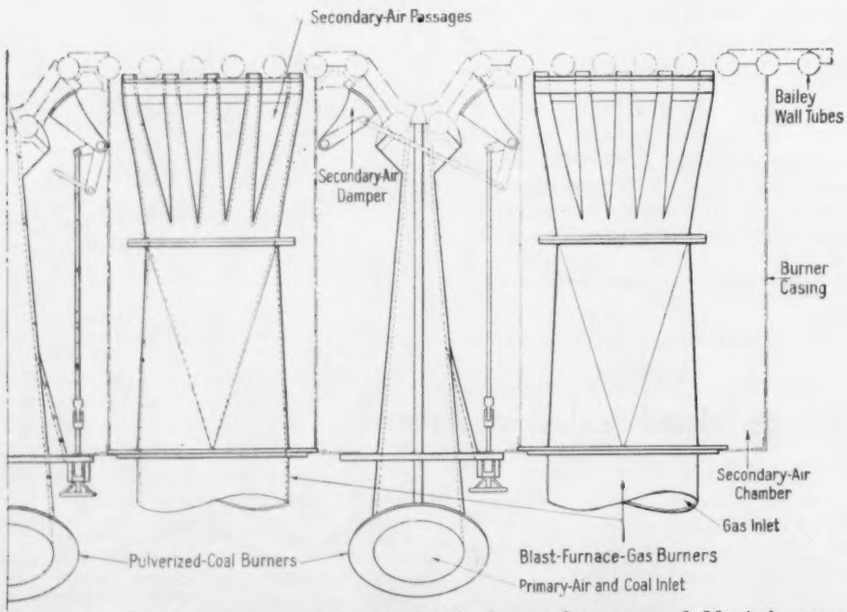
A feature of the installation is the manner in which the pulverized coal burners and gas burners are mounted in the same horizontal plane and arranged to fire between the water cooling tubes of the furnace. This arrangement results in better combustion conditions in the furnace when using any ratio of the two fuels.

The boiler was designed to deliver 300,000 pounds of steam per hour when using pulverized coal as fuel or 200,000 pounds of steam with gas fuel. The steam pressure is 350 pounds per square inch.

Although blast furnace gas will undoubtedly constitute a large proportion of the total fuel burned the boiler unit may operate continuously on pulverized coal for 30 to 60 days at a time.

The accompanying illustration is a sectional plan showing the arrangement of the pulverized coal and blast furnace gas burners. There are installed in this unit three pulverized coal burners and four blast furnace gas burners, both types being designed by the Babcock & Wilcox company.

The makers of the equipment state that this installation is an excellent example of progressive modernization work for the most efficient use of by-product fuels and is in keeping with the general idea of the universal furnace for burning solid, liquid and gaseous fuels separately or in combination.



Plan view showing arrangement of pulverized coal burners and blast furnace gas burners in steel mill boiler installation

Acetylene Association Is Meeting in Chicago

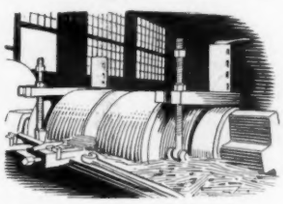
A wide range of topics has been set up for discussion at the thirty-fourth annual convention of the International Acetylene association at the Congress hotel, Chicago, Sept. 26-29. Four technical sessions are scheduled beginning with the opening session on Tuesday morning, a railroad session on Wedesday morning, an education and research session on Thursday morning and a modern metals and alloys session on Friday afternoon.

Among listed discussion topics are the following: Welding alloy steels for the process industries, importance of welding in repair of steel mill equipment, economy of hard-facing in the steel industry, the oxy-acetylene process as used in developing new railway designs, heat treating rail ends, profitable scrapping, welding in refrigeration and air conditioning, pipe welds and weld tests, welding's part in rehabilitating the brewing industry, fabrication by welding and machine cutting, and metal coating.

A feature of the convention will be a four-act play "The Prosperity Process," a unique dramatization of a theme vital to industrial executives, engineers and workmen. This play is to be presented in the Goodman theatheater on Wednesday evening.

PROGRESS IN STEELMAKING

WIRE fabric manufactured of a newly developed alloy containing approximately 80 per cent nickel, 12 to 14 per cent chromium and 6 per cent iron, is claimed to resist discolorization and corrosion without the application of paint. Wire drawn from this alloy is higher in tensile strength than is required for wire screen for household purposes.



NICKEL as an admixture with cast iron is finding wider use in the manufacture of steel mill rolls. Many roll pass contours, frequently difficult to maintain, now are held satisfactory after considerable tonnage has come off the mill. Rolls of high nickel content are finding wider usage in the reduction of flat stock.

♦ ♦ ♦

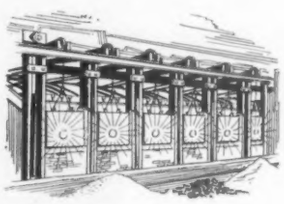
Any desired curvature in leveling is possible with a newly designed sheet leveler inasmuch as the small diameter work rolls deflect when a sheet passes between them. A triple cradle arrangement effects a closer alignment of the backup rolls to the curve of the work rolls when the latter are deflected. This alignment automatically is maintained as the curve of the work rolls increases. When pressure is desired at the center of the sheet, the main cradles are elevated and when under pressure, the main and auxiliary cradles undergo a tilting motion. This causes the backup rolls to align themselves close to the curve of the work rolls. When pressure is desired at the edges of the sheet the main cradles are lowered and they tilt with the auxiliary cradles in the opposite direction from that to which they tilt when pressure is applied against the work rolls.

♦ ♦ ♦

Recent improvement in the design and operation of recuperators involves a new method of handling the air. The air is drawn through the recuperator instead of being blown through. This is accomplished by connecting the recuperator to the suction side of the exhauster, the hot air being drawn through the ducts by the exhauster which forces it to the burners. The method is claimed to eliminate almost entirely the loss of air after heating, to permit a simplified arrangement of air passages outside the bank of recuperator tubes, to operate satisfactory with air temperatures up to 1000 degrees Fahr., and to afford a supply of air to the burners up to a maximum of approximately ½-pound per square inch.

♦ ♦ ♦

Pipe dope with nonhardening or nonfreezing qualities for making joints tight against air, gas, steam and acid has been placed on the market. Because of its plastic characteristic the joints easily can be dismantled after service. The compound also is applicable for bolt threads, flanges, gaskets and valves.



LOW coefficient of thermal expansion is claimed for a silicon-carbide refractory brick recently developed for roofs, roof skews, upper walls, lintels, sills, door arches and jambs, and doors of steel melting furnaces. The new brick is composed of silicon carbide with or without graphite, a carbon bond and a boro-silicate glaze as a protective against oxidation. Other advantages claimed for the brick include the elimination of spalling troubles and a reduction of strains in the furnace and roof linings.

WATER-FAST drawing inks, which do not deteriorate when stored for at least a year, recently were prepared by the bureau of standards. The inks were made of an aqueous 5 per cent shellac solution to which a small amount of phenol, borax and a dye were added. The shellac was unbleached, but was free from natural waxes and dirt. Ninety-two dyes were investigated, 17 found suitable and 7 selected.

♦ ♦ ♦

Uneven spiral marks, which frequently occur on the surface of thin-walled rolls, sometimes are caused by unequal temperature of the steel, according to an authority on roll grinding. This condition can be remedied by filling the roll with water through plugs at the roll ends before starting the grinding operation.

♦ ♦ ♦

Double pouring steel by utilizing two stoppers reduces the teeming time about one-half, confines the drop in the temperature of the steel to less than 100 degrees Fahr., during the pouring cycle and prolongs the life of the ladle refractories.

NEW EQUIPMENT

PRODUCTION FABRICATION TREATMENT FINISHING

New Bar Screen Embodies Self-Cleaning Features

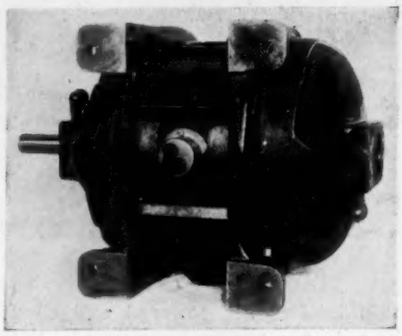
Jeffrey Mfg. Co., Columbus, O., recently placed on the market an improved self-cleaning bar screen, shown herewith. A special hinged scraper prevents jamming of the mechanism from the accumulation of foreign material in the bottom of the channel or upon the screen. In its descent the rake engages cams mounted on the runways, which turn the rake into operating position. Teeth of the rake pass entirely through the screen, cleaning not only the surface but also the spaces between the bars.

Self-cleaning automatic bar screen developed by Jeffrey Mfg. Co.

◆

Industrial Motors Protected Against Overheating

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has developed a line of Thermoguard motors, shown herewith, which have a built-in disk thermostat that functions before the temperature of the insulation reaches the danger point. Induction motors embodying this feature are available in standard horizontal type, side mounting, fan-cooled, explosion tested, enclosed or splash proof. Thermoguard direct-current motors are designed for constant, adjustable and varying speed applications. Mill motors of this self-protecting type are intended for heavy duty applications such are steel mill auxiliary drives.



Westinghouse Thermoguard self-protecting a.c. induction motor

◆

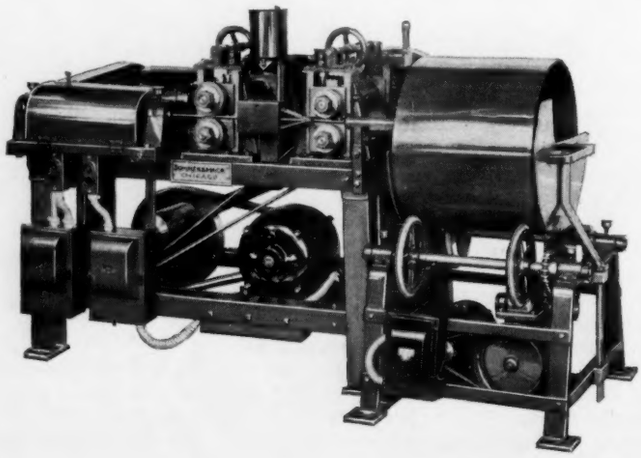
Airpainting Machine Assures A Uniform Finish

Paasche Airbrush Co., 1909-1923 Diversey Parkway, Chicago, is manufacturing a new machine for use in the application of cold materials such as paints, lacquers, dyes, etc. to metal, wood, paper or sheets of any kind. Operation is automatic except for loading. The unit will apply a uniform coat as light or heavy as desired, at any lineal speed.

◆

Wire Cutting Machine Is High-Speed Type

Sommer & Maca Glass Machinery Corp., 3600-08 South Oakley avenue, Chicago, recently developed a machine by which welding wire of various diameters can be cut to standard lengths at the rate of about 300 pieces per minute. In the same operation the welding wire can be coated. The unit, shown herewith, was developed in collaboration with C. H. Hollup. Although intended primarily for the welding wire trade, it can be used to cut wire for other purposes in lengths from 1½ inches up to several feet. On short lengths production reaches 3600 pieces per minute.

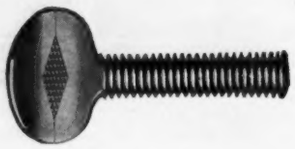


High-speed wire cutting machine recently placed on the market by Sommer & Maca Glass Machinery Corp. Production as high as 3600 pieces a minute can be obtained on short lengths of wire

◆

Cold Forged Thumb Screws Are Accurate, Uniform

Parker-Kalon Corp., 200 Varick street, New York, has introduced cold forged thumb screws made in one piece by a new and improved process. The thumb grips of the screws, shown herewith, are shaped to have pleasing proportions. Because they are free of burrs and roughness, they take a good plated finish. The knurling provides a firm finger grip. Screws are rolled-threaded to close limits. They are made in a complete range of sizes from $\frac{3}{16}$-inch 24 by ½-inch to ⅜-inch 16 by 3 inches inclusive.



Parker-Kalon cold forged knurled head thumb screw

Hold Buyers to New Heavy Steel Contracts

Definite Commitments Must Be Specified—Plates, Shapes Up $2, Bars $3, for Last Quarter—Steel Rate Off Point to 40%—Some Railroad Buying Near—Iron Shipments Heavy

A $2 PER ton advance in plates and shapes and $3 in bars becoming effective Sept. 30, fourth-quarter contracting for these heavy finished steel products is expected to be brisk this week.

Accompanying this rise is a revision of terms calculated to make a contract for heavy steel as ironclad as a contract for pig iron long has been. Beginning immediately, producers will contract on the following basis:

(1) For a definite tonnage to be completely specified in time for shipment before the last day of the quarter; (2) for a tonnage from which the buyer may deviate up 25 per cent or the mill down 25 per cent, and (3) for a stated percentage of a consumer's requirements within a specified maximum. It is possible that mills also will give protection on identified jobs for 60 days.

The fact that the present 1.60c, Pittsburgh, base on plates, shapes and bars becomes 1.75c and 1.80c Saturday is a spur to coverage. However, there are balancing penalties for under and over-estimating requirements, the former necessitating open market purchases at advanced levels and the latter the payment for and stocking of surplus material.

General business still being confused and the fourth-quarter outlook obscure, buyers normally would tend toward conservatism, but if the prospect for inflation deepens this week an investment in materials may appear more attractive than the conservation of cash. In any event, demand has been so negligible for several weeks that whatever contracting develops will represent a marked gain.

Added Labor and Fuel Charges Push Costs Up at Least $4 per Ton

An advance at this time is in the face of an ebbing market, which by the usual tests would not support a price rise, but producers point to sharp increases under the steel code as offering no alternative. Ingot costs alone have increased $2 per ton, with conversion costs bringing the total almost to $4, due chiefly to labor and fuel.

During the past week specifications against expiring contracts were so extensive the national steel rate sank only 1 point, to 40 per cent. Chicago mills gained 4 points to 44 per cent on the strength of rail releases. Youngstown mills were up 2 points to 48 per cent and Buffalo 3 to 48. Eastern Pennsylvania was steady at 35½ per cent, Detroit at 55, and Birmingham at 50. Pittsburgh eased a point to 34, Wheeling 3 to 72, Cleveland 6 to 54 and New England 10 to 86. This week New England will drop 16 points and Pittsburgh 4 points; Youngstown will gain 2.

Public work is more a factor in the structural market, prospective jobs including 4000 tons for Boulder dam, 3000 tons each for a bridge at Quincy, Mass., and for the Puget Sound navy yard, 3500 tons for a municipal auditorium at Kansas City, Mo., and 3500 tons for Middle West bridges. Last week's awards were 11,930 tons.

Govt. Shaping Up Equipment Program; President Personally Taking a Hand

Word from Washington concerning railroad purchases remains indefinite, but some support from this quarter appears certain. The New York Central's distribution of 8230 tons of rails makes a total of 17,530 released this year. Thirty-five thousand tons is said to be in prospect from the Santa Fe.

Whether tin plate mills can operate at capacity more than a month longer rests with canmakers, who may bridge the approaching seasonal letdown by manufacturing for stock at present prices. A few small lots of cast iron pipe are coming out of the public works program. Buying of hot-rolled strip has been a shade broader. Specifications for sheets, especially from automotive users, have necessitated putting on additional capacity.

Pig iron shipments continue seasonally high. For the New York vehicular tunnel 25,000 tons will be placed shortly. More Indian iron is being sold in New England. Scrap remains dull, with the easy tendency in prices dominant. Coal strikes are firming coke quotations.

Merchant rail bars have been put up $3 in conformity with hot-rolled bars, and cold-finished and alloy bars are likely to advance and retain their differentials. Hot-rolled sheets No. 10 gage are now quoted at the full price of 1.75c, Pittsburgh.

STEEL's index of iron and steel is unchanged at $31.23. The finished steel composite, however, is up 20 cents to $48.50, while the scrap index is off 17 cents to $10.71.

COMPOSITE MARKET AVERAGES

	Sept. 23	Sept. 16	One Month Ago Aug., 1933	Three Months Ago June, 1933	One Year Ago Sept., 1932	Ten Years Ago Sept., 1923
Iron and Steel Composite	$31.23	$31.23	$30.04	$28.73	$29.32	$44.64
Finished Steel Composite	48.50	48.30	47.50	45.30	47.50	68.05
Steelworks Scrap Composite	10.71	10.88	11.57	9.55	7.04	16.15

Iron and Steel Composite:—Pig iron, billets, slabs, sheet bars, wire rods, tin plate, nails, sheets, plates, shapes, bars, and black pipe. Finished Steel Composite:—Plates, shapes, bars, hot strip, nails, tin plate, pipe. Steelworks Scrap Composite:—Heavy melting steel and compressed sheets.

A COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

	Sept. 23, 1933	Aug. 1933	June 1933	Sept. 1932
Finished Material				
Steel bars, Pittsburgh	1.60	1.60	1.60	1.60
Steel bars, Chicago	1.65	1.70	1.70	1.70
Steel bars, Philadelphia	1.91	1.91	1.91	1.91
Iron bars, Chicago	1.60	1.65	1.65	1.65
Shapes, Pittsburgh	1.60	1.60	1.60	1.60
Shapes, Philadelphia	1.81 ½	1.81½	1.65	1.75
Shapes, Chicago	1.65	1.70	1.70	1.70
Tank plates, Pittsburgh	1.60	1.60	1.55	1.60
Tank plates, Philadelphia	1.79½	1.79½	1.49½	1.79½
Tank plates, Chicago	1.65	1.70	1.70	1.70
Sheets, No. 10 blue anneal., Pitts.	1.75	1.65	1.65	1.70
Sheets, No. 24, hot ann., Pitts.	2.25	2.25	2.10	2.10
Sheets, No. 24, galvan., Pitts.	2.85	2.85	2.70	2.75
Sheets, No. 10 blue anneal., Gary	1.90	1.95	1.95	1.85
Sheets, No. 24 hot ann., Gary	2.35	2.40	2.40	2.25
Sheets, No. 24 galvan., Gary	2.95	3.00	3.00	2.90
Plain wire, Pittsburgh	2.10	2.10	2.10	2.20
Wire nails, Pittsburgh	2.10	2.10	1.85	1.95
Tin plate, per base box, Pitts.	4.65	4.25	4.25	4.75
Semifinished Material				
Sheet bars, open-hearth, Youngs.	26.00	26.00	26.00	26.00
Sheet bars, open-hearth, Pitts.	26.00	26.00	26.00	26.00
Billets, open-hearth, Pittsburgh	26.00	26.00	26.00	26.00
Wire rods, Pittsburgh	35.00	35.00	35.00	37.00

	Sept. 23, 1933	Aug. 1933	June 1933	Sept. 1932
Pig Iron				
Bessemer, del. Pittsburgh	19.26	18.26	17.26	15.76
Basic, valley	17.00	16.00	15.00	14.00
Basic, eastern, del. eastern Pa.	18.19	17.38	16.19	13.75
No. 2 foundry, del. Pittsburgh	18.76	17.76	16.76	15.76
No. 2 foundry, Chicago	17.50	17.00	16.00	15.50
Southern No. 2, Birmingham	13.50	13.00	12.00	11.00
No. 2X, Eastern, del. Phila.	18.63	17.88	16.76	14.26
Malleable, valley	17.50	16.50	15.50	14.50
Malleable, Chicago	17.50	17.00	16.00	15.50
Lake Superior charcoal, del. Chi.	23.54	23.04	23.04	23.04
Gray forge, del. Pittsburgh	18.38	17.13	16.63	15.63
Ferromanganese, del. Pittsburgh	87.24	87.24	73.24	73.24
Scrap				
Heavy melting steel, Pitts.	$12.75	13.75	11.65	9.50
Heavy melting steel, eastern Pa.	10.50	12.00	9.50	7.25
Heavy melting steel, Chicago	10.00	10.40	9.25	5.75
No. 1 wrought, eastern Pa.	11.00	13.00	10.25	7.25
No 1 wrought, Chicago	9.25	10.35	8.10	5.60
Rails for rolling, Chicago	11.25	11.25	10.25	7.00
Coke				
Connellsville, furnace, ovens	2.50	2.75	1.80	2.00
Connellsville, foundry, ovens	3.25	3.10	2.40	2.75

CURRENT FINISHED STEEL PRICES

Prices conform to American Iron and Steel institute schedules. Asterisk denotes price change this week

Sheet Steel

HOT ROLLED No. 10
(24 to 48 inches wide)

*Pittsburgh, base	1.75c
*Gary, base	1.75c to 1.85c
*Chicago, del.	1.785c to 1.885c
*New York del.	2.10c
Birm., base	1.80c
*Phila. del.	2.06c
St. Louis, del.	2.09c

HOT ROLLED ANN. No. 10

*Pittsburgh, base	1.90c
Gary, base	1.90c
Chicago, del.	1.935c
*Phila. del	2.21c
*New York, del.	2.25c
St. Louis, del.	1.99c
Birm., base	1.95c
F.o.b. dock, Pacific ports	2.32½c

HOT ROLLED ANN. No. 24

Pittsburgh, base	2.25c
Gary, base	2.35c
Chicago, del.	2.385c
New York, del.	2.60c
Phila., del.	2.56c
Birm., base	2.40c
St Louis, del	2.59c
F.o.b. dock, Pacific ports	2.95c

GALVANIZED No. 24

Pittsburgh, base	2.85c
Gary, base	2.95c
Chicago, del.	2.985c
Phila., del.	3.16c
New York, del.	3.20c
Birm., base	3.00c
St. Louis, del.	3.19c
San Fran., f.o.b.	3.55c

TIN MILL BLACK No. 28

Pittsburgh, base	2.50c
Gary, base	2.60c
St. Louis, del.	2.84c

COLD ROLLED No. 10

Pittsburgh, base	2.30c
Gary, base	2.40c
Philadelphia, del.	2.61c
New York, del.	2.65c

COLD ROLLED No. 20

Pittsburgh, base	2.75c
Gary, base	2.85c
Philadelphia, del.	3.06c
New York, del.	3.10c

ENAMELING SHEETS

Pitts., No. 10	2.40c to 2.45c
Pitts., No. 20	2.90c

Tin and Terne Plate

Per 100-lb. box, Pittsburgh

Tin plate, coke base, contract	$4.65
Do., stock	4.05
Long ternes, No. 24 unassorted	2.90c

Gary base, 10 cents higher.

Corrosion, Heat Resistant Alloys

Base, Pittsburgh

18% chrome, 8% nickel sheets, 35c; plates, 31c; bars, 28c.

	A	B	C	D
Bars	19c	20.5c	23c	28c
Plates	21c	22.5c	25c	30c
Sheets	26c	27.5c	30c	35c
Hot Strip	19c	20.5c	23c	28c
Cold Strip	25c	26.5c	29c	34c

Carbon 0.12 and under; no nickel. A has chrome 15% and under. B over 15/18% inc., C over 18/23% inc., D over 23/30%.

Steel Plates

Pittsburgh, base	1.60c
New York del.	1.90c
Phila., del.	1.79½c
Boston, del.	2.02c
Buffalo, del.	1.85½c
Chicago, base	1.65c
Cleveland, del.	1.80½c
Birmingham, base	1.75c
Coatesville, base	1.70c
Sparrows Point, base	1.70c
Pac. Coast, f.o.b.	2.15c
St. Louis, del.	1.89c

Eff. Sept. 30, $2 ton advance at all points.

Structural Shapes

Pittsburgh, base	1.60c
Philadelphia, del.	1.81½c
New York, del	1.87c
Boston, del.	2.00½c
Bethlehem base	1.70c
Chicago, base	1.65c
Cleveland, del.	1.80½c
Buffalo, base	1.70c
Birmingham, base	1.75c
Pac. Coast, f.o.b.	2.15c
Do., wide flange	2.25c

Eff. Sept. 30, $2 ton advance at all points.

Bars

SOFT STEEL

Pittsburgh, base	1.60c
Chicago, base	1.65c
Birmingham, base	1.75c
Buffalo, base	1.70c
Pacific Coast ports, c.i.f.	2.10c
Cleveland, base	1.65c
Philadelphia, del.	1.91c
New York, del.	1.95c
San Fran., f.o.b.	2.15c
Pitts., forg. qual.	1.85c

Eff. Sept. 30, $3 ton advance at all points.

RAIL STEEL

*Chicago, to manufacturing trade 1.70c

IRON

Chicago, base 1.60c
Philadelphia, base 1.60c
Pitts., refined..... 2.70c to 4.20c

REINFORCING

New billet

Pittsburgh, cut lengths.... 1.90c
Chicago, Youngstown, O., Birmingham, Ala., Cleveland, Buffalo 1.95c
Gulf ports 2.20c
Pacific coast ports 2.35c

Rail steel

Pittsburgh, base 1.75c
Chicago, Buffalo, Cleveland, Gary, Ind., Youngstown, O. 1.80c
Gulf ports 2.15c
Pacific coast ports..... 2.30c

Wire Products □ □

(Prices apply on carload lots. Mixed carloads 10 cents higher; joint carloads up 20 cents; less carloads up 30 cents. Nail extras subject to 10 per cent discount on straight or mixed carload shiped to single consignee.)

F.o.b. mills, 100 lb. keg

Standard wire nails $2.10
Cement coated nails 2.10
Galvanized nails 3.60

(Per pound)

Polished staples 2.80c
Galvanized fence staples.. 3.05c
Barbed wire, gal. 2.60c
Annealed fence wire 2.25c
Galvanized wire 2.60c
Woven wire fencing (base column, c.l.).....$55.00

(To Manufacturing Trade)

Plain wire, 6-9 gage 2.10c

Anderson, Ind., and Chicago, $1 over Pitts.-Cleve.; Duluth and Worcester, $2 higher; Fairfield. Ala., $3 higher.

Spring wire 3.10c

Chicago and Waukegan $1 higher. Worcester $2 higher.

Cold-Finished Bars □

Base Pitts., one size, shape, grade, shipment at one time to one destination

10,000 to 19,999 lbs 1.95c
20,000 to 59,999 lbs..... 1.90c
60,000 to 99,999 lbs..... 1.85c
100,000 lbs. and over....1.82½c

Chicago, Cleveland and Buffalo 5c higher.

Shafting □ □

(Turned and ground)
Cumberland, Md., base

1⅛-inch 3.25c
1 1/16 to 1½-inch..... 2.75c
1 3/16 to 1⅞-inch..... 2.60c
1 15/16 to 2⅞-inch..... 2.45c
2 15/16 to 6-inch..... 2.30c

Alloy Steel □ □

Hot rolled, f.o.b. Pittsburgh, Buffalo, Chicago and Massillon, O., 2.45c. F.o.b. Bethlehem, Pa., 2.55c.

Differentials to various classes of consumers.

S.A.E.	Alloy Diff.	S.A.E.	Alloy Diff.
2000	0.25	3100	0.55
2100	0.55	3200	1.35
2300	1.50	3300	3.30
2500	2.25	3400	3.20
4100 .15 to .25 Mo.			0.50
4600 .20 to .30 Mo. 1.25-1.75 Ni.			1.05
5100 .80-1.10 Cr.			0.45
5100 Cr. spring			0.20
6100 bars			1.20
6100 spring			0.95
Cr., Ni., Van.			1.50
Carbon van.			0.95
9250 (flats)			0.25
9250 (rds., sq.)			0.50

Strip, Hoops, Bands □

*Hot-rolled strip up to 23 15/16-in. wide, Pitts.. 1.75c
Do., Chicago..... 1.75c to 1.85c
* Do., del. Phila. 2.06c
* Do., del. N. Y. 2.10c
Cooperage hoop, Pittsburgh ..... 1.75c to 1.85c
Do., Chicago..... 1.85c to 1.90c
*Cold-rolled strip Pitts., Cleve. 2.40c
Worcester, 3 tons or over ..... 2.45c to 2.60c

Rails, Track Material □

Stand. rails, mill $40.00
Relay rails, Pitts. (Gross Ton)
20-45 lbs. $24.50
50-75 lbs. $20.00
80-100 lbs. $23.50
Light rails, billet qual., Pitts. $32.00
Do., reroll, qual. $31.00
Angle bars, mills 2.55c
Spikes, R. R., Pitts. 2.40c
Track bolts, base 3.40c
Tie plates, Pitts... 1.90c
Tie plates, Chi..... 1.90c

Base, railroad spikes 200 kegs or more; base tie plates, 20 tons or more; differentials for less.

Base, light rails, 25 to 40 pounds; 50 to 60 pounds inclusive, $5 extra; 16 and 20 pounds, $1 extra; 12 pounds, $2 extra; 8 and 10 pounds, $5 extra.

Bolts and Nuts □ □

Pittsburgh, Cleveland, Birmingham, Chi. Discounts to legitimate jobbing or large consuming trade for full-case lots, Dec. 1, 1932, lists.

CARRIAGE BOLTS

All sizes, cut thread.....73 off
Rolled thread, ½ x 6 and smaller .....73 off

MACHINE BOLTS

All sizes, cut thread, lag screws, plow bolts, Nos. 1-2-3-7 heads, tap bolts, blank bolts, stud bolts without nuts .....73 off
Tire bolts .....60 off
Stove bolts, 72½-25-10 off in pkgs.; 85 off in bulk, 5000 or more of a size.
Rolled thread machine bolts, ½ x 6 and smaller, 73 off.
Step Bolts .....70 off
Elevator bolts .....70 off

NUTS

Semifinished .....73 off

HEXAGON CAP SCREWS

Milled .....85 off
Upset 1-in., smaller.....85-10 off

SQUARE HEAD SET SCREWS

Upset, 1-in., smaller.....80 off
Upset, larger than 1-in.....80 off
Headless set screws.....75-10 off

Rivets, Wrought Washers

Struc. c.l., Pitts-Cleve. 2.50c
Struc., c.l., Chi..... 2.60c
7/16-in. & smaller, Pitts., Chi., Cleve. .....70, 10 and 5 off

*Wrought washers, mill 6.00 off

Cut Nails, Piling □

Cut nails, Pitts.; (10% discount on size extras) $2.75
Do. less carloads, 5 kegs or more; no discount on size extras $3.00
Do., less than 5 kegs; no discount on size extras $3.15
Steel piling, Pitts. 1.90c
Steel piling, Buff. 2.00c
Steel piling, Chi. 2.00c

Pipe and Tubing

Base $200 net ton, except on standard commercial seamless boiler tubes under 2 inches and cold drawn seamless tubing.

Welded Iron, Steel Pipe

Base discounts on steel pipe, Pittsburgh and Lorain, O., to consumers in carloads, Indiana Harbor, Ind., and Evanston, Ill., 2 points less. Chicago delivered, 2½ points less. Wrought pipe, Pittsburgh base.

BUTT WELD

Steel

In.	Blk.	Gal.
¼ and ⅜	57	38½
½	62	50½
¾	65½	55½
1—3	67½	58½

Iron

½	31½	15
¾	36½	20½
1—1¼	39½	25½
2	41½	26

LAP WELD

Steel

2	63½	54½
2½—3	66½	57½
3½—6	68½	59½
7 and 8	67½	57½
9 and 10	67	57

Iron

2	37	22½
2½—3½	38	25
4—8	40	28½
9—12	38	24½

LINE PIPE

Steel

⅛-inch, butt weld	50½
¼—⅜, butt weld	56
½, butt weld	61
¾, butt weld	64½
1—3, butt weld	66½
2-inch, lap weld	62½
2½—3, lap weld	65½
3½—6, lap weld	67½
7—8, lap weld	66½
9—10, lap weld	66
11—12, lap weld	65

Iron

⅛—1½ inch, black and galv. take 4 pts. over; 2½—6 inch 2 pts. over discounts for same sizes, standard pipe list. 8—12 inch no extra. 2-inch line discount unchanged from list prior to April 15, 1933.

BOILER TUBES

C. L. Discounts, f.o.b., Pitts.

Lap Weld Steel		*Charcoal Iron*	
2—2¼	33	1¾	8
2½—2¾	40	2—2¼	13
3	47	2½—2¾	16
3¼—3¾	50	3	17
4	52	3¾—3½	18
4½—6	42	4	20
1½	1	4½	21

On lots of a carload or more, above base discounts subject to preferential of two 5 per cent discounts on steel and 10 per cent on charcoal iron.

Lap Welded Steel—Under 10,000 pounds, 6 points under base and one 5 per cent; on 10,000 pounds to carload, 4 points under base and two 5 per cents. Quantity discounts, same as for hot rolled below. Charcoal Iron—Under 10,000 pounds; 2 points under base; on 10,000 pounds to carload, base and one 5 per cent.

STANDARD COMMERCIAL SEAMLESS BOILER TUBES

Cold Drawn

2—2¼	27	3¼—3½	44
2½—2¾	34	4	46
3	41	4½, 5, 6	36

(On 1—1¾-inch sizes mechanical tubing discounts apply.)

Hot Rolled

2—2¼	33	3¼—3½	50
2½—2¾	40	4	52
3	47	4½, 5, 6	42

Quantity discounts are: Under 10,000 pounds, 10 points and 5 per cent; 10,000 to 24,999 pounds, 6 points and 5 per cent; 25,000 pounds to carload, 2 points and 5 and 5 per cent; carload and over, base discount and 5 and 5 per cent. No extra for lengths up to and including 24 feet. Sizes smaller than 1 inch and lighter than standard gage to be held at mechanical tubes list and discount.

Seamless Tubing □

Cold drawn; f.o.b. mill disc.

100 ft. or 150 lbs.....40%
15,000 ft. or 22,500 lbs.....70%

Cast Iron Water Pipe □

Class B Pipe—Per Net Ton

6-in. & over, Birm....$35.00-36.00
4-in., Birm. 38.00-39.00
4-in. Chicago 46.40-47.40
6 to 24-in. Chicago 43.40-44.40
6-in. & over, N. Y... 34.50-36.50
4-in. New York..... 36.50-38.50

Class A pipe $3 over Class B.
Stand. fitgs., Birm. base..$90.00

Six to 24-inch, fittings, base; over 24-inch plus $20; 4-inch, plus $10; 3-inch, plus $20; gas pipe fittings, $5 higher.

RAW MATERIAL PRICES

Prices conform to American Iron and Steel institute schedules. Asterisk denotes price change this week

Iron Ore

LAKE SUPERIOR ORE
Gross ton, 51½%, Lower Lake Ports

Old range bess.	$4.30
Mesabi bessemer	4.65
Old range nonbess.	4.65
Mesabi nonbess.	4.50
High phosphorus	4.40

EASTERN LOCAL ORES
Cents, unit, del. E. Pa.

Foundry and basic, 56-63%, con. (nom.)	8.00- 9.00
Cop-free low phos. 58-65% (nom.)	10.00-10.50

FOREIGN ORE
Cents per unit, f.a.s. Atlantic ports (nom.)

Foreign manganiferous ore, 45-55% iron, 6-10% man.	8.50
No. Afr. low phos.	7.00
Swedish basic, 65%	8.00
Swedish lo wphos.	8.50
Spanish, No. Afr. basic, 50 to 60%	7.00
*Tungsten, spot, sh. ton unit, duty pd.	$12.25-12.50
N. F. fdy., 55%	7.00
Chrome ore, 48% gross ton c.i.f.	$17.00-18.00

Manganese Ore

(Nominal)

Prices, not including duty, cents per unit, cargo lots.

Caucasion, 52-55%	22.00
So. African, 52%	21.00-22.00
So. Afr., 49-51%	20.00-21.00
Indian, 48-50%	nominal

Refractories

FIRE CLAY BRICK
Per 1000 f.o.b. Works
First Quality

Pa., Ohio, Ill., Ky., Md., Ga., Mo.	$45.00
Alabama	48.00

Second Quality

Pa., Ohio, Ill., Ky., Md., Mo., Ga., Ala.	40.00

MALLEABLE BUNG BRICK

All bases	50.00

SILICA BRICK

Pennsylvania	$45.00
Joliet E. Chicago	54.00
Birmingham, Ala.	55.00

MAGNESITE BRICK
Per Net Ton, 9 x 4½ x 2½

Burned	$65.00
Unburned	55.00

CHROME BRICK
Per Net Ton

F.o.b. ship. point	$45.00

MAGNESITE

Dead burned grain, Chester, Pa., Baltimore bases, net	40.00
Domes, Chewelah, Wash., base	22.00

Fluorspar

85 and 5 per cent grade

Washed gravel, duty paid, tide, gross ton	$20.00
Washed gravel f.o.b. Ill., Ky., net ton, carloads	$14.00

Semifinished Steel

Prices Per Gross Ton
BILLETS AND BLOOMS
4 x 4-inch base

Pitts., Chi., Cleve., open-hth. & bess.	$26.00
Philadelphia	31.75
Forging, Pitts., Chi.	31.00

SHEET BARS

Pitts., Cleve., Yong.	26.00
Chicago	26.00
Canton, O.	26.00

SLABS

Pitts., Cleve., Yong.	26.00

WIRE RODS

Pitts., Cleveland	$35.00
Chicago	36.00

SKELP

All grades, Pitts.	1.60c

Coke

Price Per Net Ton
BEEHIVE OVENS

Connellsville fur.	$2.50- 2.75
Connellsville fdry.	3.25- 3.50
Connell. prem. fdry.	4.50
New River fdry.	6.00
Wise county fdry.	4.25- 5.00
Wise county fur.	3.50- 4.25

BY-PRODUCT FOUNDRY

Newark, N. J., del.	8.71- 9.31
Chi. ov., outside del.	8.00
Chicago, del.	8.75
New England, del.	10.50
St. Louis, del.	8.25
Birmingham, ovens	4.50
Indianapolis, del.	8.75
Ashland, Ky., Connells., basis	5.50
Portsmouth, ovens, Connell. basis	5.50
Buffalo, ovens	7.50- 8.00
Detroit, ovens	8.00
*Philadelphia, del.	9.00

Ferroalloys

(In dollars, except Ferrochrome)

Ferromanganese, 78-82% tidewater, duty pd.	82.00
del. Pitts.	87.24
Spiegeleisen, 19-20%, dom., fur., spot†	27.00
Ferrosilicon, 50%, frieght all., c. l.	74.50
Do, less carload	82.50
Do, 75 per cent	120-130.00
Spot, $5 a ton higher.	
Silicomang., 2½ carb.	85.00
2% carbon	90.00
1% carbon	100.00
Ferrodhrome, 66-70 chromium, 4-6 carbon, cts. lb con. del.	9.50
Do, spot del.	10.00
Ferrotungsten, stand., lb. cont.	1.04 -1.10
Ferrovanadium, 35 to 40%, lb. cont., on analysis	2.60- 2.80
Ferrotitanium, c.l., prod. plant, frt. allow., net ton	137.50
Spot, 1 ton, frt., all., lb.	8.50
Do, under 1 ton	9.00
Ferrophosphorus, per ton, c. l. 17-19%, Rockdale, Tenn., basis; 18%, $2 unitage	50.00
Ferrophosphorus, electrolytic, per ton c. l., 23-26% f.o.b. Anniston, Ala., 24% $2.75 unitage	65.00
Ferromolybdenum, stand. 50-60%, lb	0.95
Molybdate, lb. cont.	0.80

†Carloads. Quan. diff. apply.

Pig Iron

Delivered prices do not include switching charges except as noted. No. 2 foundry iron is 1.75-2.25 silicon; 25-cent differentials apply for each 0.25 silicon above 2.25

Gross Tons

	No. 2 Fdry.	Malleable	Basic	Bessemer
Basing Points:				
Bethlehem, Pa.	$17.50	$18.00	$17.00	$18.50
Birdsboro, Pa.	17.50	18.00	17.00	18.50
Swedeland, Pa.	17.50	18.00	17.00	18.50
Sparrows Point, Md.	17.50	18.00	17.00	18.50
From Swedeland, Pa., del. to Phila.	18.26	18.76	17.76	.....
From Bethlehem, del. to Brooklyn	19.77	20.27	.....	.....
From Bethlehem, del. to Newark, N. J.	18.99	19.39	.....	.....
Basing Point:				
Everett, Mass	18.00	18.50	17.50	19.00
From Everett, del. to Boston, flat rate, with surcharge	19.00	19.50	18.50	20.00
Basing Point:				
Buffalo	17.50	18.00	16.50	18.50
From Buffalo, del. to Boston	19.00	19.50	18.50	20.00
Bethlehem, del. to Newark, N. J.	18.99	19.39	.....	.....
Basing Points:				
Neville Island, Pa.	18.00	18.00	17.50	18.50
Sharpsville, Pa.	17.50	17.50	17.00	18.00
Youngstown, O.	17.50	17.50	17.00	18.00
From Neville Island, Pa., del. to Pittsburgh	(Neville Island base, plus 50 to 76 cents switching charges)			
Basing Points:				
Erie, Pa.	17.50	18.00	17.00	18.50
Cleveland	17.50	17.50	17.00	18.00
Toledo, O.	17.50	17.50	17.00	18.00
Detroit	17.50	17.50	17.00	18.00
From Detroit, del. to Saginaw, Mich.	19.60	19.60	19.10	20.10
From Cleveland, del. to Akron, Canton, O.	18.76	18.76	18.26	19.26
From Toledo, del. to Mansfield, O.	19.26	19.26	18.76	19.76
Basing Point:				
Hamilton, O.	17.50	17.50	17.00	18.00
From Hamilton, del. to Cincinnati	18.51	18.51	18.01	19.01
Do., del. to Indianapolis	19.77	19.77	19.27	20.27
Basing Points:				
Duluth	18.00	18.00	.....	18.50
Chicago	17.50	17.50	17.00	18.00
Granite City, Ill.	17.50	18.00	17.00	.....
From Duluth, del. to St. Paul	19.94	19.94	.....	20.44
From Chicago, del. to Milwaukee	18.50	18.50	18.00	19.00
From Chicago, Toledo or Detroit, del to Muskegon, Mich.	20.40	20.40	19.90	20.90
From Granite City, del. to St. Louis	(Granite City base, plus 56 to 75 cents switching charges)			
Basing Point:				
Birmingham, Ala.	13.50	.....	12.50	.....
From Birmingham del. to:				
Boston	18.62	.....	18.12	.....
Newark, N. J.	18.51	.....	.....	.....
Brooklyn, N. Y.	19.39	.....	.....	.....
Baltimore	18.02	.....	17.52	.....
Cleveland	19.64	.....	18.64	.....
Cincinnati	18.23	.....	17.11	.....
Chicago	18.16	.....	19.14	.....
St. Louis	18.05	.....	17.05	.....
Basing Point:				
Provo, Utah	16.50	.....	.....	.....

LOW PHOS.

Basing points: Birdsboro, Pa., Steelton, Pa., and Standish, N. Y.—$22.00. Basing point: Johnson City, Tenn.—.....
Philadelphia, standard and copper bearing..... 23.13

GRAY FORGE		CHARCOAL	
Valley furnace	17.25	Lake Superior fur.	20.50
Pitts. dist. fur.	17.75	Do., del. Chicago	23.54

SILVERY

Jackson County, O., base: 6%—$22.25; 7—$23.25; 8—$24.25; 9—$25.25; 10—$26.25; 11—$27.75.

BESSEMER FERROSILICON

Jackson County, O., base: 10%—27.25; 11—$28.75; 12—$30.25; 13—31.75; 14—$33.25; 15—$34.75; 16—$36.25.

Bars

Fourth Quarter Prices Set $3 Per Ton Higher—Buying Is In Moderate Volume

BAR PRICES, PAGE 78

FOURTH quarter contracting generally is proceeding under three regulations adopted by producers. The first form of contract covers the consumer for a specific tonnage, which must be taken out. The second provides for a spread of 25 per cent between minimum and maximum amounts named. The third binds the consumer to take a stated percentage of his total requirements for the quarter. It is understood a fourth form is being prepared permitting a 60-day protection on material for identified jobs.

Pittsburgh—A Pittsburgh bar mill filed a price of 1.75c, Pittsburgh, last week as its market for fourth quarter, thereby superseding its announcement three weeks ago when 1.60c, Pittsburgh, was named. There had been, however, little contracting for fourth quarter at 1.60c and it is expected that the new 1.75c base, which is a $3 a ton advance, will uniformly go into effect ten days after the price was filed, or Oct. 1. Forging quality bars taking their $5 a ton extra, therefore, will be quoted 2.00c base, Pittsburgh, for next quarter.

Cleveland—Consumers of commercial steel bars have until the close of Sept. 29 to contract for fourth quarter at 1.65c, base, Cleveland, on specific tonnages that must be taken out by Dec. 31. An advance of $3 a ton to 1.80c, base, Cleveland, will be put in effect, beginning with Sept. 30. A leading producer announced this policy late last week, and it is expected that others will follow, though the local mill interest and some other sellers had not reached a definite decision, and some refused to go beyond Sept. 30 at current prices, except for shipment at their earliest convenience. Slowing in the market is attributed more to uncertainties arising out of code interpretations than to underlying conditions.

Chicago—A new price of 1.80c, Chicago, on steel bars and 1.70c on rail steel bars has been filed for fourth quarter, an advance of $3 a ton over the current market, following a short period during which producers temporarily withheld quotations on future business. Previously 1.65c had been announced for extension over fourth quarter. Specificatios and shipments have been in fair volume while interest in future requirements has lagged. Consumption by the automotive industry, while moderately lower, still leads.

Philadelphia—Some gain in bar specification may develop over the remainder of this month, in view of the $3 advance which goes into effect Sept. 30. The current market is 1.60c, Pittsburgh, or 1.91c, Philadelphia.

Carpenter Steel Co., Reading, Pa., has been awarded 119,474 pounds of annealed tungsten-chromium steel bars at 15 cents per pound, for the arsenal at Frankford, Pa.

Boston—Industrial demand is sluggish for carbon, forging and alloy steel bars. Consumers have shown little interest in last quarter requirements while sellers, because of uncertainty as to prices. have not pushed sales.

New York—With an increase of $3 a ton scheduled for Sept. 30, steel bar sellers here look for some improvement over the remainder of this month. Inquiry is light, reflecting confusion over new differentials and methods of operating under the code.

Plates

Advance Of $2 Per Ton For Fourth Quarter—Navy Lets Material For New Ships

PLATE PRICES, PAGE 78

FOURTH quarter contracting generally is proceeding under three regulations adopted by producers. The first form of contract covers the consumer for a specific tonnage, which must be taken out. The second provides for a spread of 25 per cent between minimum and maximum amounts named. The third binds the consumer to take a stated percentage of his total requirements for the quarter. It is understood a fourth form is being prepared permitting a 60-day protection on material for identified jobs.

Pittsburgh—The advance of $2 a ton in plates which Pittsburgh plate mills filed last week as their price for fourth quarter is expected to give stimulus to an otherwise slow plate market by driving in some specifications. Fesenmeier Beverage Co., Huntington, W. Va., has placed 300 tons of plates for tanks with Littleford Bros. Inc., Cincinnati, and McClintic-Marshall Corp. will fabricate 250 tons of plates in a span over Independence street, Pittsburgh, for the Pittsburgh & West Virginia railroad.

Cleveland — Effective Sept. 30, plates will be up $2 a ton to 1.70c, base, Pittsburgh, for fourth quarter. The current price is 1.60c, and some leading producers announced willingness to book specific tonnages at this figure up to the close of Sept. 29 for delivery before Dec. 31. For buyers of plates, shapes and bars who truck their material some producers have explained their policy as follows: On carload lots add to the base price the carload freight rate from the basing point to destination, and allow 65 per cent of the carload freight rate from shipping point to destination. On orders for less than carload lots add to the base price the less-carload freight rate from the basing point to destination, and allow 65 per cent of the carload freight rate from shipping point to destination.

Chicago—Fourth quarter books on plates now are opened at 1.75c, Chicago, an advance of $2 a ton over the current market, which temporarily was extended but at which figure little forward business had been booked. Business consists mostly of small lots.

Boston—Low bids of 2.20c and 2.28c, delivered, were made on several hundred tons of medium black plates for destroyers to be built at Boston. An even larger tonnage of galvanized plates will be required. A fair volume of miscellaneous buying has been done at 1.70c, Coatesville, Pa., but practically nothing has been done for fourth quarter.

Philadelphia — Pending the advance of $2 a ton Sept. 30 most plate sellers are accepting orders for specific amounts, noncancelable and subject to no revision, for delivery at mills' convenience in fourth quarter. While little tonnage has developed, it is believed that higher prices Sept. 30, will stimulate some buying. The present market is 1.70c, Coatesville, Pa., and Sparrows Point, Md., or 1.7925c, delivered, Philadelphia.

Contracts Placed

800 tons, six Mississippi river barges for Texas Co., to unstated fabricator.

700 tons, tanks for three unspecified breweries, to Chicago Steel Tank Co., Chicago.
600 tons, tanks for Union Oil Co., at Oleum, Calif., to Consolidated Steel Corp., Los Angeles.
480 tons, navy department, Washington, for Boston, Philadelphia and Norfolk, Va., yards, to Lukens Steel Co., Coatesville, Pa.
443 tons, Panama canal, to United States Steel Products Co., New York.
375 tons, 1,500,000-gallon tank, Columbia, S. C., to Pittsburgh-Des Moines Steel Co., Pittsburgh.
320 tons, navy department, Washington, for Mare Island Calif. and Puget Sound, Wash., navy yards, to Bethlehem Steel Corp. Bethlehem, Pa.
300 tons, tanks for Fesenmeier Beverage Co., Huntington, W. Va. to Littlefield Bros. Inc., Cincinnati.
250 tons, plate girder span, over Independence street, Pittsburgh, for Pittsburgh & West Virginia railroad, to McClintic-Marshall Corp., Bethlehem, Pa.
240 tons, navy department, Washington, for Boston, Norfolk and Philadelphia yards, to Jones & Laughlin Steel Corp., Pittsburgh.
160 tons, navy department, Washington, for Mare Island, Calif., and Puget Sound, Wash., yards, and 90 tons for Boston, Norfolk and Philadelphia yards, to Carnegie Steel Co., Pittsburgh.
157 tons, 60-inch welded pipe, Hetch Hetchy project, San Francisco, to Western Pipe & Steel Co., San Francisco.
105 tons, tanks, Heidelberg Brewing Co., Covington, Ky., to Stanwood Corp., Covington Ky.
100 tons, tanks, La Center and Minnesota Lake, Minn., to Pittsburgh-Des Moines Steel Co., Des Moines, Iowa.
60 tons, navy department, Washington, for Mare Island, Calif., and Puget Sound, Wash., yards, to Worth Steel Co., Claymont, Del.

Contracts Pending

477 tons, caissons for Grand Island bridge, Buffalo, Foundation Co., New York, will buy.
200 tons, estimated, plates and shapes, dump barge, Panama; Bethlehem Steel Export Corp., New York, low on plates, shell liners and straps, $17,364.36, and on shapes, $8184.15. Buffalo Bolt Co., North Tonawanda, N. Y., low on rivets, $1375.11. Bids Sept. 15.
200 tons, three 250-horsepower boilers for San Diego naval operating base, San Diego, Calif.; bids Sept. 28.

Refractories Buying Less

Refractories Prices, Page 80

Pittsburgh—Buying of refractory brick has fallen off noticeably in September. Steel companies in particular are buying only small fill-in lots. Base prices are unchanged from the advance of Aug. 7. However, refractory producers are considering fourth quarter prices.

Bolt, Nut Buying Light

Bolt, Nut, Rivet Prices, Page 79

Orders and shipments of bolts and nuts show a shrinkage and some producers find business 20 to 25 per cent below the comparable period in August. Small orders are the rule, similar to the condition during the summer. Railroad buying has shown some improvement but is not up to expectations. Automotive needs are smaller and jobbers are buying little. The outlook for October is better, as code provisions are better understood.

Extension of current prices to cover October, with no announcement for the remainder of fourth quarter, is general. This makes October prices 73 off on bolts and nuts, 2.50c, Pittsburgh, and 2.60c, Chicago, on large rivets, 70, 10 and 10 off on small rivets. A manufacturer of wrought washers continue to quote 6.25 off, Pittsburgh and Chicago, for immediate shipment, but will not quote for fourth quarter.

Shipments on October purchases must be completed by Nov. 15.

Sheets

Rush Of Specifications On Expiring Contracts Sustaining Operations—New Buying is Light

SHEET PRICES, PAGE 78

Pittsburgh — A Pittsburgh base price of 1.75c on No. 10 gage hot rolled sheets now is in effect, the 10-day period following the filing of this advance price having expired last week. There has been no change in any other base price of sheets for this district. As the fourth quarter approaches and some early automotive buying is expected, an important test of the 2.75c price on light autobody and 2.30c on heavy autobody, will soon develop. Sheet mills, with few exceptions, report declining specifications and backlogs, now not exceeding three to four weeks.

Cleveland—Sheet specifications on third quarter contracts were so heavy mills have been forced to extend deliveries to Oct. 15. Consumers, particularly in the automotive industry, availed themselves of every opportunity to obtain as much material as possible under their contracts. It is understood that some of the motor car companies increased storage space to stock sheets and strip. These stocks in some instances are reported sufficient to carry them beyond Oct. 30. Sheet mill operations here and in the adjacent lake district continue near capacity. Some new orders for fourth quarter have been booked at the advanced price, mainly fill-in requirements.

Boston—Little forward buying is noted. Shipments on old contracts have been fairly heavy. Small spot buying has been done at 1.75c, Pittsburgh, for No. 10 hot rolled; 2.85c for galvanized; and 2.25c for black.

Chicago—New sheet business is slow to develop, and continued heavy production in closing out old contracts steadily is reducing mill backlogs. Producers anticipate a resumption in new buying early in October. Automotive requirements are well maintained. No further changes have been made in fourth quarter prices, which will continue at present levels except for a $2 a ton advance for No. 10 gage hot rolled annealed sheets.

Buffalo—Demand for sheets continues well in excess of that for other finished steel products, with local production near 70 per cent. Buying is on a quick shipment basis.

New York—A lull continues in sheet buying, most consumers being fairly well stocked with tonnage released against old contracts. No. 10 hot rolled is firm at 1.75c, Pittsburgh; black 2.25c; galvanized 2.85c; No 10 cold-rolled 2.30c; and No. 20 cold-rolled 2.75c, plus the 35 cent carload rate from Pittsburgh.

Philadelphia — While still busy with specifications against old contracts, sheet sellers report little new tonnage. Sellers generally are quoting 1.75c, Pittsburgh, on No. 10 hot-rolled 2.25c on black; 2.85c on galvanized; 2.30c on No. 10 cold-rolled; and 2.70c on No. 20 cold-rolled, with the delivered prices locally reflecting the 31-cent carload rate from Pittsburgh. The Edward G. Budd Mfg. Co. here released approximately 25,000 tons of cold-rolled sheets to various sellers over the past few weeks.

Cincinnati—Sheet production has been reduced, with backlogs on old contracts practically exhausted.

St. Louis—Sheet demand tends to taper slightly, consumers being inclined to await early fourth quarter developments before making large commitments. Shipments continue on a liberal scale, and some scattered spot business is being booked.

Birmingham, Ala.—Sheet mill operations still are fairly active. No indications of steady booking for fourth quarter are noted.

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Structural Shapes

Price Advanced $2 a Ton For Fourth Quarter—Contracting For That Period At 1.60c, Up To Sept. 30—Seadromes May Take 125,000 Tons to Bridge Atlantic

STRUCTURAL SHAPE PRICES, PAGE 78

FOURTH quarter contracting generally is proceeding under three regulations adopted by producers. The first form of contract covers the consumer for a specific tonnage, which must be taken out. The second provides for a spread of 25 per cent between minimum and maximum amounts named. The third binds the consumer to take a stated percentage of his total requirements for the quarter. It is understood a fourth form is being prepared permitting a 60-day protection on material for identified jobs.

Pittsburgh—Inquiry has declined slightly, as have recent orders. Producers have announced that effective with the fourth quarter the price of plain material will be 1.70c base, Pittsburgh, an advance of $2 a ton. Wide flange shapes will carry the usual $2 a ton extra over this base. or 1.80c, Pittsburgh.

Cleveland—Though plain material has been firm recently at 1.60c, base, Pittsburgh, on certain projects it has been figured that fabricated quotations were $18 to $20 a ton less than they would have been had the fabricator's code been in effect. Final action on the code still is awaited. Buyers have until the close of Sept. 29 to contract for at 1.60c on specific tonnage for delivery by Dec. 31. Leading producers have announced an advance of $2 a ton for fourth quarter, effective Sept. 30.

Approval of loans and grants amounting to $8,990,000 to Cleveland by the public works administration at Washington will release shortly 1000 tons of shapes and concrete bars for an incinerator.

Chicago—New structural inquiry is headed by 2500 tons for a municipal auditorium at Kansas City, and includes more than 3500 tons for bridges in midwestern and western states. Extensions to a Springfield, Ill., powerhouse will require 700 tons. Awards of about 3500 tons are made up principally of bridge work. Plain material has been advanced for fourth quarter to 1.75c, Chicago, up $2 a ton.

Boston—A bridge over Fore river at Quincy, Mass., will take approximately 3000 tons of shapes. Other bridges contemplated in New England take close to 10,000 tons, bids on the substructures of two over the Cape Cod canal likely to go in late in the year.

New York—Low contractors' bids on steel for the Grand Island bridge superstructure at Buffalo were: 5.05c carbon structural steel truss spans; 4.55c, carbon steel except truss spans, and 6.35c silicon structural steel in place. Third low bidder on the total contract was lower on silicon steel, 6c for the north, and 6.2c for the south bridge. Considerable postoffice work in the East again has been postponed. Fourth quarter prices on plain material will be $2 higher, or 1.80c, eastern mill.

Philadelphia—Increased specifying of shapes, especially from the jobber trade, is expected over the remainder of this month in view of the $2 a ton advance, effective Sept. 30. Current prices are 1.70c, Bethlehem, or 1.8155c, Philadelphia.

Washington—Application for a loan of $30,000,000 from the public works administration has been made by the Seadrome Ocean Dock Corp., to finance five floating landing fields for airplanes between the United States and Europe. It was stated by sponsors of the corporation that the project would require 125,000 tons of steel, and give employment to 10,000 men.

Contracts Placed

3250 tons, building, departments of health, sanitation and hospitals, Manhattan (New York) to Lehigh Structural Steel Co., Allentown, Pa.; Cauldwell-Wingate Co., New York, general contractor.

1200 tons, Madden Dam. Panama Canal Zone, to Virginia Bridge & Iron Works, Roanoke, Va.

920 tons, bridge, Culbertson, Mont., to McClintic-Marshall Corp., Bethlehem, Pa.

800 tons, Marquette Brewing Co., Peoria, Ill., to Truscon Steel Co., Youngstown, O.

720 tons, state bridge, Grant county, Oklahoma, to Pittsburgh-Des Moines Steel Co., Des Moines, Iowa; Leo Sanders, Oklahoma City, Okla., general contractor.

420 tons, bridge, Rensselaer and Washington counties, New York, to American Bridge Co., Pittsburgh; through Collins Bros.

400 tons, state bridge, Randolph county, Arkansas, to Pittsburgh-Des Moines Steel Co., Des Moines, Iowa.

380 tons, bridge, Pocahontas, Ark., to Pittsburgh-Des Moines Steel Co., Pittsburgh.

325 tons, alterations, Fruehauf Trailer Co. building, Detroit, to R. C. Mahon Co., Detroit.

300 tons, brewery building, F. & M. Schaefer Co., Brooklyn, N. Y., to George A. Just Co., New York; through Cauldwell-Wingate Co.

280 tons, M-G-M stages, Los Angeles, to Consolidated Steel Corp., Los Angeles.

250 tons, bridge, South Dakota, to Pittsburgh-Des Moines Steel Co., Pittsburgh.

240 tons, state bridges, Monroe, Leflore and Tallahatchie counties, Mississippi, to Stupp Bros. Bridge & Iron Co., St. Louis; Pigford Bros., general contractors.

210 tons, bridge, Barker's Landing, Del., to Virginia Bridge & Iron Co., Roanoke, Va.; through Snyder Engineering Co.

200 tons, Cameron Desert View bridge, Arizona, to Kansas City Structural Steel Co., Kansas City, Mo.

195 tons, bridge No. 2, Rockland Del., to Belmont Iron Works, Philadelphia.

190 tons, state bridge in Coconino county, Arizona, to unnamed interest.

160 tons, additional, specification 6251, Los Angeles, to Columbia Steel Co., San Francisco.

150 tons, Loveland, Colo., to Midwest Steel & Iron Works Co., Denver.

150 tons, West Virginia state bridge, to Pan-American Bridge Co., New Castle, Ind.; opening of Aug. 30.

145 tons, bridge, Jacksonville, Fla., to Ingalls Iron Works Co., Birmingham, Ala.

140 tons, state bridge, Gowan, Latimer county, Oklahoma, to J. B. Klein Iron & Foundry Co., Oklahoma City; W. R. Johnson, Weleetka, Okla., general contractor.

139 tons, specification 6250, Los Angeles, to Columbia Steel Co., San Francisco.

125 tons, state bridge, Johnson county, Arkansas, to Virginia Bridge & Iron Co., Roanoke, Va.

125 tons, West Virginia state bridge, to Wheeling Structural Steel Co., Martins Ferry, O.; opening of Aug. 30.

110 tons, library addition, San Marino, Calif., to Pacific Iron & Steel Co., Los Angeles.

106 tons, bridge in Pend Oreille National

Shape Awards Compared

	Tons
Week ended Sept. 23	11,930
Week ended Sept. 16	11,893
Week ended Sept. 9	6,659
This week in 1932	9,499
Weekly average, 1932	14,285
Weekly average, 1933	13,912
Weekly average, Aug.	6,982
Total to date, 1932	602,160
Total to date, 1933	542,602

Forest, Idaho, to unnamed interest.

100 tons, bridges, Richardson county, Nebraska, to St. Joseph Structural Steel Co., St. Joseph, Mo.

100 tons, gates for Boulder dam, Boulder City, Nev. General contract to John W. Beam, Denver; subcontract for shapes to unnamed interest.

100 tons, art gallery, Pasadena, Calif., to Pacific Iron & Steel Co., Los Angeles.

100 tons, additional for factory at 3600 Mines avenue, Los Angeles, to McClintic-Marshall Corp., Los Angeles.

Contracts Pending

3000 tons, machine and electric shop, Puget Sound, Wash., navy yard; bids Oct. 9.

2757 tons piling and special Y piles breakwater Indiana Harbor Ind.; bids Oct. 2, United States engineer, Chicago.

2500 tons, municipal auditorium, Kansas City, Mo.

1200 tons, Pittsburgh postoffice ramps; W. F. Trimble & Sons Co., Pittsburgh, low for general contract, and Aronberg-Fried Co. Inc., New York, second low.

935 tons state bridge, Meramec river, Missouri; bids in.

800 tons, building, Toledo Scale Co., Toledo, O.; bids being taken.

700 tons, power house extension, Springfield, Ill.

700 tons, highway bridge, Nebraska.

700 tons, gates for Winfield, W. Va., locks; bids Oct. 2.

680 tons, state bridge, Russian river, Mendocino county, California; bids opened.

675 tons, brewery, Liberty Brewing Co., Brooklyn N. Y.

650 tons, brewery, Michel Brewing Co., Brooklyn, N. Y.

535 tons, mainly piling, bulkhead, near Houma, La.; bids Oct. 5.

525 tons, highway bridges, Tennessee.

475 tons, piling, dike, near Port Bolivar, Tex.; bids in Sept. 22, United States engineer, Galveston, Tex.

425 tons, stadium, Columbia, S. C., Virginia Bridge & Iron Co., Roanoke, Va., low.

410 tons, highway bridges, West Virginia.

400 tons, West Virginia state bridge; E. R. Mills Co., Huntington, W. Va., general contractor; bids Sept. 19.

400 tons, bridge, Park Falls, Wis.

300 tons, six bridges for Alaska road commission; bids in.

300 tons, Firestone Tire & Rubber Co service station, Davenport, Iowa.

300 tons, state bridges, Saco and Phillips-Gardner, Me.

260 tons, highway bridge, Arizona.

250 tons, highway bridge, Iowa.

205 tons, emergency dam stoplogs, Harvey lock, Louisiana-Texas intracoastal waterway near Harvey, La.; bids Oct 5, United States engineer, New Orleans.

200 tons, highway bridge Minnesota.

200 tons, school No. 37, Buffalo; bids soon.

185 tons, state bridge, Vergennes, Vt.

145 tons, state bridge, Feliz creek, Hopland, Calif.; bids opened.

126 tons, state bridges on project NRH 98-D, Arizona; bids Sept. 26.

125 tons, state highway bridge, Corning, N. Y.; bids at Albany, Oct. 3.

123 tons, state bridge, North Fork Feather river, Plumas county, California; bids opened.

120 tons, bridges and railroad overpass, Petrified Forest National park, Apache and Navajo counties, Arizona; bids in Sept. 26.

Concrete Bars

Market Is Quieter, and Awards Are Lighter—Mesh Requirements In Some Eastern States Heavy—Prices Reaffirmed For Fourth Quarter By Eastern Interest

REINFORCING BAR PRICES, PAGE 79

Pittsburgh—Although an advance in hot-rolled bars is being asked for the fourth quarter, producers of new billet steel bars and rail steel have not yet considered their markets for that period. In the meantime, cut lengths of new billet bars for reinforcing purposes remain 1.90c, Pittsburgh, and rail steel bars 1.75c. Revised and inclusive basing points and prices on both types of reinforcing steel are shown on page 85 of this issue of STEEL.

Cleveland—Sales here are light, few projects being figured. The Cleveland producer is quoting 1.85c, base, Cleveland, for new billet steel bars in mill lengths, with the price for fourth quarter as yet undefined.

Chicago—Reinforcing bar awards and inquiries involve small lots individually. Large orders for proposed public work have yet to appear but are expected shortly for highway and dam construction. Some uncertainty has arisen in prices as a result of a conflict between mill and warehouse quotations, the latter on small lots being below the mill figure. This discrepancy is expected to be corrected shortly. Mills are quoting 1.95c for cut lengths of billet bars and 1.80c for rail steel bars.

Boston—Reinforcing steel buying includes 165 tons for a highway in New Hampshire and small lots for bridges. District producers of rail steel bars are firm at 1.80c, Buffalo, while recent buying of cut length billet bars has been done at 1.95c, Buffalo.

New York—Despite heavy purchases of state highway mesh, a large volume remains to be bought for New York and New Jersey. Openings last week required 2000 tons, most of which is now being placed. Billet steel concrete bars are dull. The low bidder on the general contract for the Grand Island bridge superstructure at Buffalo bid 3.4c for the north bridge and 3.6c, south bridge; 580 tons for both.

At least one large producer has reaffirmed prices on reinforcing bars for fourth quarter.

Philadelphia—The 1000 tons of road steel for various jobs in New Jersey on which bids will go in before Oct. 1, are outstanding in the market. Within the limits of Philadelphia there is scarcely any demand at present. Billet bars in cut lengths are steady at 1.90c, Pittsburgh; or 2.21c, delivered, Philadelphia. Rail steel bars are 2.06c, delivered, Philadelphia.

Concrete Awards Compared

	Tons
Week ended Sept. 23	2,112
Week ended Sept. 16	2,720
Week ended Sept. 9	5,682
This week, 1932	8,317
Weekly average, 1932	3,920
Weekly average, 1933	3,439
Weekly average, Aug.	3,074
Total to date, 1932	163,955
Total to date, 1933	134,118

Contracts Placed

324 tons, San Gabriel dam No. 1, Los Angeles county, California, to Graham Bros., Los Angeles.

300 tons, mesh, Wayne county, New York, to American Steel & Wire Co., New York; Rochester Paving Co., Rochester, N. Y., general contractor.

170 tons, mesh, Daniel Webster highway section, Belknap county, New Hampshire, to American Steel & Wire Co., New York; Lane Construction Co., Meriden, Conn., general contractor.

151 tons, conduit on Venice boulevard, Los Angeles, to Pacific Coast Steel Corp., San Francisco.

150 tons, mesh, state highway, Dublin, N. H., to American Steel & Wire Co., New York; New Haven Road Construction Co., general contractor.

150 tons, brewery for Rainier Brewing Co., San Francisco, to Pacific Coast Steel Corp., San Francisco.

140 tons two state bridges in Washington, to Pacific Coast Steel Corp., Seattle; Western Construction Co., Seattle, general contractor.

100 tons, or more, state hospital, Mount Morris, N. Y., to Capital Steel Co., New York.

100 tons, road work, Illinois, to Calumet Steel Co., Chicago.

100 tons, store building, Beloit Wis., to unstated interest.

100 tons, Centlivre Brewing Co., Ft Wayne, Ind., to Truscon Steel Co. Youngstown, O.

100 tons, Fritz Brewing Co., Freeport Ill., to Kalman Steel Co., Bethlehem Pa.

100 tons, state highway work in six

counties, California, to unnamed interests.

Unstated tonnage, 60,000 squares, noncorrosive reinforcing fabric, United States engineer, Memphis, Tenn., to Copperweld Steel Co., Glassport, Pa.

Contracts Pending

4000 tons, Boulder dam, specification 3285, Boulder City, Nev.; Colorado Fuel & Iron Co., Denver, low on schedule 2, 2800 tons, Pacific Coast Steel Corp., San Francisco, low on schedule 1, 1200 tons.

1700 tons, mesh and bars, mainly mesh, highway work, New York state, included in contracts opening Sept. 19.

785 tons, highway reinforcement, Montgomery, Lowndes and Dallas counties, Alabama; bids Sept. 29.

500 tons, postoffice ramps, Pittsburgh; W. F. Trimble & Sons Co., Pittsburgh, low for general contract.

325 tons, school No. 37, Buffalo; bids soon.

232 tons, highway work on state project NRH 98-D, Arizona; bids Sept. 26.

226 tons, state highway work in 16 counties in California; bids opened.

192 tons, state highway work in Los Angeles county, California; bids opened.

150 tons, state bridge over Feather river, Plumas county, California; bids opened.

145 tons, conduit on Muscatel street, Los Angeles; bids opened.

115 tons, state highway work near Grand Canyon, Arizona; bids opened.

107 tons, Russian river bridge, near Hopland, Calif.; bids opened.

104 tons, highway work on state project NRH 98-C, Arizona; bids Sept. 26.

104 tons, state bridge, Carmel river, Monterey county, California; bids Oct. 4.

100 tons, highway work in Moffat county, Colorado; bids Sept. 23.

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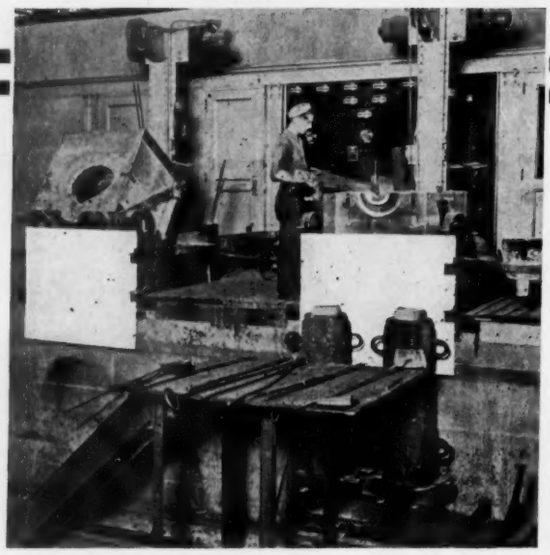

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Wire

Inquiry Is At Low Level; Deliveries Are Heavy

Wire Prices, Page 79

Pittsburgh—Buyers of merchant wire products are placing fewer orders and forward inquiry is negligible. The Pittsburgh base price on straight or mixed carloads of standard wire nails remains $2.10 per keg, with annealed fence wire 2.25c and galvanized fence wire 2.60c. On spring wire 3.10c, Pittsburgh, is the market, with plain wire to the manufacturing trade is 2.10c. Over five miles of fencing in 30,000 lineal feet for the United States naval ammunition depot, Hawaii, was awarded to the Anchor Post Fence Co., New York, last week.

Cleveland—Shipments of wire and wire products continue heavy, but new business is light. Contracts for fourth quarter are being booked at unchanged prices of 2.10c, Cleveland, for manufacturers' wire, and $2.10 for nails.

Chicago — Although interest in fourth quarter requirements of wire and wire products is light, shipments against contracts continue in fair volume. Jobbers are placing little new business and farm districts have shown little change in requirements. The market is extended on fourth quarter business at $2.15 for wire nails and 2.15c for plain wire.

Cold-Finished Price Near

Cold Finished Prices, Page 79

Pittsburgh—Fourth-quarter price on cold-finished steel has not been determined, but announcement seems imminent. Indications are the base price will follow the recent advance in hot-rolled steel, the usual spread being $7 per ton. It is now believed the new price will be 2.10c. Specifications and shipments of cold-finished tend downward each week.

Pipe

Tubular Products Quiet, with Slower Shipments to Oil Districts—Cast Tonnages Held Up

PIPE PRICES, PAGE 79

Pittsburgh—Tonnage in tubular products being placed the past week shrank to even smaller proportions. Absence of buying is especially noted in line pipe, and there has been a recent slump in shipments to the oil country. A gas line pipe job for Clyde, N. Y., on which an inquiry is expected, will not amount to much more than 100 tons although prospective work of a similar nature for nearby villages may involve more tonnage. Pipe discounts are all unchanged and considerably firmer now with the adoption of the steel code.

Boston—Cast pipe buying is light, mostly in small lots. Until financing is arranged, several large projects are in abeyance. Steel pipe demand is sluggish, lack of heating and construction contracts having an adverse influence.

New York—Other than about 300 tons of 8 and 12-inch pipe and fittings for New York city, on which bids are in, little activity is noted in cast pipe. For state highway work, contractors now have the option of laying cast iron or reinforced concrete pipe, many specifying the latter because of lower price. The $35, eastern foundry price, for cast pipe is not firm.

Chicago—Some additional loans for proposed waterworks and sewage disposal plants have been approved but most of these are small and placing of cast pipe orders is delayed. Orders and inquiries consequently are light. While prices are unchanged, higher quotations are expected to follow recent increases in wage and material costs.

Birmingham, Ala. — Continued slowness is reported in the cast iron pressure pipe market and awards are few and scattered. Backlogs are being reduced steadily. Little raw material is being stocked in shop yards.

Cast Pipe Placed

225 tons, pipe and fittings, Greensburg, Ky., to United States Pipe & Foundry Co., Burlington, N. J.; small tank to Chicago Bridge & Iron Works, Chicago.

125 tons, 12-inch centrifugal, Tacoma, Wash., to United States Pipe & Foundry Co., Burlington, N. J.

Steel Pipe Placed

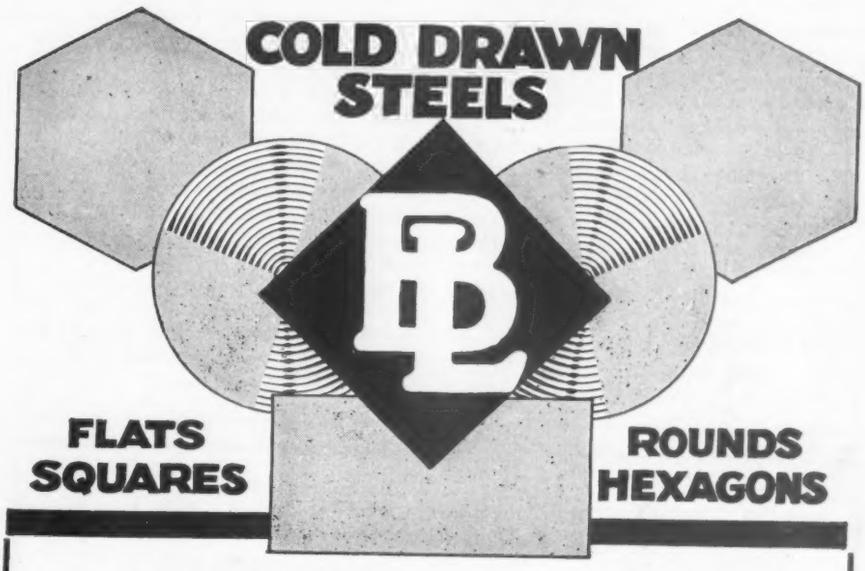
120 tons, galvanized and extra-strong black, small sizes, Panama; galvanized to S. Weinstein Supply Co., New York; black to Thomas Somerville Co., Washington.

Unstated tonnage, steel boiler tubes, bureau of supplies and accounts, navy, eastern yards; to Pittsburgh Steel Co., Pittsburgh, by lot; remainder to Globe Steel Tubes Co., Milwaukee.

Cast Pipe Pending

425 tons, 10-inch, bureau of supplies and accounts, navy, Puget Sound, Wash.; bids Oct. 10.

Ferro Machine & Foundry Co., Cleveland, in two weeks in July sold more than 600 gasoline pumps at advanced prices.



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Pig Iron

New Buying Mostly Small Lots For Quick Shipment—Hurry To Clear Old Contracts

PIG IRON PRICES, PAGE 80

Pittsburgh—Little more than 50 and 100-ton lots of iron is being sold in the merchant market here. Slackness is partly due to the fact present prices will be continued through fourth quarter; at least, so is the present intent. No basic inquiries are up, and rumor of the purchase of basic by one nonintegrated mill here appears unfounded. Small quantities of Birmingham, Ala., foundry iron continue sold here, mainly for production of light radiator castings. Neville Island, Pa., and Sharpsville, Pa., base prices are unchanged on foundry and bessemer grades.

Cleveland—Additional sales have been made for fourth quarter at the lake furnace base of $17.50. Melters, however, are limiting purchases to small lots, with the total booked by furnace interests here during the week approximately 3000 tons. Strength is imparted to the market by further coal mine difficulties and prospects for higher fuel costs. Shipments to date this month still are substantially ahead of the comparable period of August.

Chicago—Shipments are holding well and the movement so far in September shows only a slight decrease from a month ago. In addition, tonnage remaining on books is sufficient to indicate fairly steady movement over the balance of the year. New business is light, partly because users have some unshipped tonnage yet to be taken out, and what orders are being received generally are for small lots. The market continues $17, furnace, for No. 2 foundry and malleable.

Boston—With most larger users covered well into fourth quarter, new buying and inquiry are light. Except that southern iron has a 38-cent advantage, all domestic quotations are uniform at $18, Everett base, for foundry iron. Some sellers are agitating for correction of the price situation as it pertains to the southern grade. Dutch iron is reported selling at $18, point of storage. More Indian iron has been sold and one consumer who bought 7500 tons of this brand early in the year, still has considerable stock. Against a contract, shipments of low phosphorus iron have been heavier recently.

Philadelphia — Chief feature of the local market is the opening of bids, Sept. 26, by the Port of New York Authority on approximately 50,000 tons of cast iron segments, which the trade estimates will take at least 25,000 tons of pig iron. Shipments against contracts hold up fairly well, with foundries operating better than last month. No. 2 plain is holding at $18.26, delivered Philadelphia; malleable at $18.76; basic at $17.76; and bessemer at $19.26. Southern foundry iron here is $17.38.

Buffalo—Only a few sales are being made, for immediate shipment, with little forward buying. Consumers are especially cautious in contracting for fourth quarter needs because of uncertainty of melt, and much iron remains to be sold for that period. Six furnaces continue in production.

Cincinnati — Interest in fourth quarter needs is lagging. Many melters covered beyond third quarter requirements, and are not making additional purchases. Shipments indicate most of the iron on old contracts will be taken out by Sept. 30.

St. Louis—Shipments are declining, after heavy movement in July and August. New business is in small volume, mostly for prompt delivery. No basic buying has developed. Stove plants continue active, and jobbing shops still have fair backlogs.

Birmingham, Ala.—Spot buying continues and aggregate sales are not equal to production. Shipments are a little better as old contracts are being worked down. No change in output is noted, though intimation has been given that two furnaces may be banked shortly.

Toronto, Ont.—Sales are holding to a steady weekly average rate of between 500 and 600 tons. Demand, however, is mostly in single-car lots with no booking for future delivery. Foundry interests report daily melt holding around 25 per cent as an average, with some running upward of 50 per cent. Mills are maintaining an average rate of close to 50 per cent. Pig iron production continues

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Cass at Bagley Avenue

at its peak level for the year. Prices are firm and unchanged.

Coke

Connellsville Market Nominal; Expect Higher October Price

Coke Prices, Page 80

Prices of foundry coke from the Connellsville area is nominal, though furnace coke is steady at $2.50, ovens. In foundry grades $3.25 is the nominal asking price on common and $4.50 in premium grades. The Pensylvania mine strike is having a disturbing effect.

At Chicago no price has been announced on by-product coke for October, awaiting effects of the coal code. The current quotation is $8, ovens, for outside delivery and $8.75 for Chicago delivery.

Strip

Production High On Orders; Current Sales Are Light

Strip Prices, Page 79

Pittsburgh—Since Sept. 15 the market on strip steel has been 1.75c, Pittsburgh, on hot-rolled, and 2.40c, Pittsburgh, on cold-rolled, the only prices to the contrary being those invoiced on shipments that contract buyers have at less. Shipments on these contracts were requested last week in increased amount. The price of 1.75c, Pittsburgh, on hot-rolled strip has not been affected by the revised fourth-quarter price on bars, bringing the latter up to 1.75c, Pittsburgh. For the time being the base on strip will stand at 1.75c for delivery over the balance of the year.

Chicago—Closing of strip contracts holds shipments at a relatively heavy rate. The fourth quarter market is quoted 1.85c, Chicago for hot strip and 2.70c, delivered, for cold-rolled strip.

Philadelphia—Strip sellers report little improvement in demand as consumers are well covered. Hot-rolled is 1.75c, Pittsburgh, or 2.06c, delivered, Philadelphia.

New York—Cold rollers are letting up in their demand for hot strip. The market is holding firmly at 1.75c, Pittsburgh, on hot-rolled and 2.40c on cold-rolled, plus the 35-cent carload rate from Pittsburgh.

Cleveland—Strip mill operations are expected to continue at a high level well into October, due to heavy last-minute specifications on third quarter contracts. Cold-rolled for fourth quarter is 2.40c, base, Cleveland; and hot-rolled, 1.75c, base, Pittsburgh.

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Scrap

Prices Soften As Buying Is Held Back—Some Tonnages Covered As Reserves Melt

Pittsburgh—Suspensions appear to be lifting and although one large downriver mill stopped shipment of all scrap last week, several other mills began to take in scrap on orders, a condition contrasting to a few weeks back. The heavy melting market ranges between $12.50 and $13, the most recent at $12.50. One mill has requested that all orders be cleaned up by the end of this month, an order which apparently forecasts re-entry soon after Oct. 1. A small sale of blast furnace borings and turnings last week at $8.50 has reduced the market on that grade. Machine shop turnings were slightly more active last week to several points and a $10 market seems current. Low-phos specialties are quiet with asking prices between $14.50

IRON AND STEEL SCRAP PRICES

Corrected to Friday night. Gross tons delivered to consumers, except where otherwise stated

HEAVY MELTING STEEL

Birmingham	9.50 to 10.50
Boston, dealers	6.75 to 7.25
Buffalo, No. 1	10.50 to 11.00
Buffalo, No. 2	9.75 to 10.00
Chicago	9.50 to 10.00
Cleve., No. 1	10.50 to 11.00
Cleve., No. 2	10.00 to 10.50
Det., No. 1	8.25 to 8.75
Det., No. 2	7.25 to 7.75
E. Pa.	10.50 to 11.00
E. Pa., No. 2	9.50 to 10.00
Federal, Ill.	8.75 to 9.25
Granite City, Ill.	8.25 to 8.75
N. Y., deal. R. R.	7.00 to 8.00
N. Y., deal. No. 2	6.00 to 7.00
N. Y. deal. yd.	5.50 to 6.00
Pitts., No. 1	12.50 to 13.00
St. L. No. 1 del.	9.75 to 10.25
Valleys, No. 1	13.00 to 13.50

COMPRESSED SHEETS

Buffalo, dealers	9.75 to 10.00
Chi. (Factory)	8.00 to 8.50
Cleveland	10.00 to 10.50
Detroit	8.25 to 8.75
E. Pa. new mat.	10.00 to 10.50
Pittsburgh	12.25 to 12.75
Valleys	12.50 to 13.00

BUNDLED SHEETS

Buffalo	5.50 to 6.00
Cincinnati, del.	6.00 to 6.50
Cleveland	8.00 to 8.50
Eastern Pa.	9.00 to 9.50
Pittsburgh	11.25 to 11.75
St. Louis	6.00 to 6.50

SHEET CLIPPINGS LOOSE

Chicago	4.50 to 5.00
Cincinnati	5.00 to 5.50
Detroit	6.00 to 6.50
St. Louis	5.50 to 6.00

STEEL RAILS SHORT

Birmingham	11.50 to 12.00
Boston, dealers	7.00 to 7.25
Buffalo	12.00 to 12.50
Chicago (3 ft.)	11.00 to 11.50
Chicago (2 ft.)	12.00 to 12.50
Cincinnati, del.	12.00 to 12.50
Detroit	10.50 to 11.00
Pitts. (open-hearth, 3 ft. and less)	14.50 to 15.00
St. Louis	11.50 to 12.00

STOVE PLATE

Birmingham	7.00 to 8.00
Boston, dealers	4.50 to 4.75
Buffalo	9.00 to 9.50
Chicago, net	7.00 to 7.50
Cinci., deal.	7.00 to 7.50
Detroit, net	4.50 to 5.00
Eastern Pa.	9.50
N. Y. deal. Fdry.	6.00
St. Louis	7.00 to 7.50

COUPLERS, SPRINGS

Buffalo	11.50 to 12.00
Chicago	10.50 to 11.00
Eastern Pa.	14.00 to 15.00
Pittsburgh	14.50 to 15.00
St. Louis	10.00 to 10.50

ANGLE BARS—STEEL

Chicago	10.50 to 11.00
St. Louis	10.00 to 10.50

LOW PHOSPHORUS

Buffalo, billets and bloom crops	11.50 to 12.50
Cleveland bil. and bloom crops	12.50 to 13.50
Eastern Pa. crops	14.00 to 15.00
Pittsburgh billet bloom crops	14.50 to 15.00
Pitts., sheet bar crops	14.50 to 15.00

FROGS, SWITCHES

Chicago	9.50 to 10.00
St. Louis	10.00 to 10.50

SHOVELING STEEL

Chicago	9.50 to 10.00
Cleveland	10.50 to 11.00
St. Louis	9.00 to 9.50

RAILROAD WROUGHT

Birmingham	8.00 to 8.25
Boston, dealers	2.00 to 2.50
Buffalo, No. 1	7.00 to 8.00
Buffalo, No. 2	10.50 to 11.00
Chi., No. 1, net	8.00 to 8.50
Chi., No. 2	9.50 to 10.00
Cinci., No. 2	9.50 to 10.00
Eastern Pa.	11.00 to 11.50
N. Y., No. 1 deal.	8.00 to 8.50
Pitts., No. 1	12.50 to 13.00
St. Louis, No. 1	7.00 to 7.50
St. Louis, No. 2	8.75 to 9.25

SPECIFICATION PIPE

Boston	4.00 to 4.50
Eastern Pa.	9.50 to 10.00
N. Y., deal.	5.50 to 6.00

BUSHELING

Buffalo, No. 1	9.75 to 10.00
Chicago, No. 1	7.75 to 8.25
Cinci., No. 1 deal.	7.00 to 7.50
Cinci., No. 2	3.50 to 4.00
Cleve., No. 2	8.00 to 8.25
Det., No. 1 new	7.00 to 7.50
St. Louis, No. 1	6.50 to 7.00
Val. new No. 1	12.50 to 13.00

MACHINE TURNINGS

Birmingham	4.00 to 5.00
Boston, dealers	2.75 to 3.00
Buffalo	6.50 to 7.00
Chicago	5.50 to 6.00
Cinci., deal.	5.50 to 6.00
Cleveland	7.75 to 8.00
Detroit	5.50 to 6.00
Eastern Pa.	7.50 to 8.50
N. Y., deal.	4.00 to 4.50
Pittsburgh	9.50 to 10.00
St. Louis	4.50 to 5.00
Valleys	10.75 to 11.00

BORINGS AND TURNINGS
For Blast Furnace Use

Boston, dealers	2.50 to 2.75
Buffalo	6.50 to 7.00
Cinci., deal.	5.50 to 6.00
Cleveland	7.75 to 8.25
Detroit	6.50 to 7.00
Eastern Pa.	7.00
N. Y., deal.	3.00
Pittsburgh	9.25 to 9.75

CAST IRON BORINGS

Birming., plain	3.50 to 4.50
Boston, chem.	10.00 to 11.00
Boston, dealers	3.25 to 3.50
Buffalo	6.50 to 7.00
Chicago	5.50 to 6.00
Cinci., deal.	5.50 to 6.00
Cleveland	7.75 to 8.25
Detroit	6.50 to 7.00
E. Pa., chem.	12.00 to 15.00
N. Y., deal.	3.00
Pittsburgh	8.50 to 9.00
St. Louis	4.75 to 5.25

PIPE AND FLUES

Cinci., deal.	4.50 to 5.00

RAILROAD GRATE BARS

Buffalo	5.00 to 5.50
Chicago, net	7.00 to 7.50
Cincinnati	5.00 to 5.50
Eastern Pa.	9.00 to 9.50
N. Y., deal.	5.25 to 5.50
St. Louis	6.00 to 6.50

FORGE FLASHINGS

Boston, dealers	5.00 to 5.50
Buffalo	9.00 to 9.50
Cleve. ov. 10 in.	9.00 to 9.50
Detroit	7.50 to 8.00

FORGE SCRAP

Boston, dealers	4.00 to 4.50
Chicago (heavy)	11.00 to 11.50
Eastern Pa.	10.50

ARCH BARS, TRANSOMS

Chicago, net	8.00 to 8.50
St. Louis	9.50 to 10.00

AXLE TURNINGS

Boston, dealers	4.50 to 4.75
Buffalo	7.50 to 8.00
Chi., elec. fce.	8.00 to 8.50
Cleveland	9.50 to 10.00
Eastern Pa.	9.50 to 10.00
St. Louis	5.50 to 6.00

STEEL CAR AXLES

Birmingham	11.00 to 11.50
Boston, ship. pt.	8.00 to 8.50
Buffalo	10.00 to 11.00
Chicago, net	10.00 to 10.50
Eastern Pa.	15.50
St. Louis	11.50 to 12.00

SHAFTING

Boston, ship. pt.	9.25 to 9.75
Eastern Pa.	15.00 to 15.50
N. Y., deal.	10.00 to 10.25
St. Louis	8.00 to 8.50

CAR WHEELS

Birming., iron	9.00 to 9.50
Boston, iron deal.	6.75 to 7.25
Buffalo, iron	8.00 to 9.00
Buffalo, steel	11.00 to 11.50
Chicago, iron	9.50 to 10.00
Chi., rolled steel	10.50 to 11.00
Cincinnati, iron	9.00 to 9.50
E. Pa., iron	12.00 to 13.00
E. Pa., steel	14.00 to 15.00
Pitts., iron	11.75 to 12.25
Pitts., steel	14.50 to 15.00
St. Louis, iron	8.50 to 9.00
St. Louis, steel	10.00 to 10.50

NO. 1 CAST SCRAP

Birmingham	9.00 to 10.00
Boston, No. 2	5.00 to 5.50
Boston, Tex. con.	10.75 to 11.00
Buffalo, cupola	10.00 to 10.50
Buffalo (mach.)	11.00 to 11.50
Chicago, agri. net	8.25 to 8.75
Chi., mach. net	9.50 to 10.00
Chi., railroad net	9.00 to 9.50
Cinci., mach. cup.	9.00 to 9.50
Cleve. cupola	10.50 to 11.00
Detroit, net	8.00 to 8.50
E. Pa., cupola	12.00 to 13.00
N. Y., cup. deal.	6.00 to 6.50
N. Y., del. local foundries	9.00 to 9.50
Pitts., cupola	11.50 to 12.00
San Fran., del.	13.50 to 14.00
Seattle	4.50 to 6.50
St. Louis, No. 1	9.00 to 9.50
St. L. No. 1 mach.	9.00 to 9.50

HEAVY CAST

Boston, del.	5.75 to 6.00
Buffalo, break	7.00 to 8.00
Cleve., break	7.50 to 8.00
Detroit break	5.50 to 6.00
Detroit, auto net	8.50 to 9.00
Eastern Pa.	11.00
N. Y., No. 1, deal.	7.00 to 7.50
N. Y., break. deal.	6.25 to 6.75
Pittsburgh	11.00 to 11.50

MALLEABLE

Boston, consum.	12.50 to 13.00
Buffalo	11.00 to 12.00
Chicago, R. R.	10.50 to 11.00
Cinci., agri. del.	8.50 to 9.00
Cinci., R. R. del.	9.25 to 9.75
Cleveland, rail	11.50 to 12.00
Detroit, auto	7.50 to 8.00
St. Louis, R. R.	9.50 to 10.00
Eastern Pa., R. R.	13.00 to 14.00

RAILS FOR ROLLING
5 feet and over

Birmingham	10.00 to 11.00
Boston, dealers	7.00 to 7.25
Buffalo	9.00 to 9.50
Chicago	11.00 to 11.50
Eastern Pa.	13.00
New York, dealer	8.00 to 8.25
St. Louis	10.50 to 11.00

LOCOMOTIVE TIRES

Chicago, cut	10.50 to 11.00
St. L., No. 1	8.50 to 9.00

LOW PHOS. PUNCHINGS

Buffalo	11.00 to 11.50
Chicago	11.00 to 11.50
Eastern Pa.	13.00 to 14.00
Pittsburgh	14.50 to 15.00

and $15. Cast scrap still is strong here, with heavy breakable now advanced to $11 to $11.50 and No. 1 cupola $11.50 to $12. Prices within these ranges were paid last week by a district foundry. Two important plant dismantling programs in the Pittsburgh district may yield over 10,000 tons of scrap in the near future. Bundled and hydraulic compressed sheets appear to be easier.

Cleveland—Conditions in the steel and iron scrap market are dull, with no buying and no arrivals by boat. Prices are untested and show no change.

Chicago—While the scrap market continues weak as a result of absence of new business and restricted shipments against orders, prices remain fairly steady, although nominal. Distress offerings have been few. Heavy melting steel is unchanged at $9.50 to $10.

Boston—Except for some moderate buying of cast grades, mostly heavy breakable, there is little demand for scrap, with prices easier on several grades, including shafting at $9.50, shipping point. Breakable cast is quoted at $6, f.o.b. Steelworks grades are dull and heavy melting steel has declined 50 cents to $6.75 to $7.25.

Philadelphia—Scrap has been reduced on several grades here, with No. 1 heavy melting steel holding at $10.50 to $11, delivered, eastern Pennsylvania, and No. 2 at $9.50 to $10. A tonnage of No. 2 steel is reported placed by the Conshohocken, Pa., consumer.

Buffalo—Weakness has appeared in the principal grades of scrap but sales have not made a test. Consumers show no interest but have not bought far ahead and will need tonnage soon.

Detroit—Weakness prevails in practically all grades of steel and iron scrap, and quotations are lower. Demand from local and distant steel mills has ceased. Some observers believe the market will go lower before turning upward.

Birmingham, Ala.—While the market is unchanged as to orders and prices a little better feeling is noted as prospects in the pipe industry brighten. Heavy melting steel and No. 1 cast are the most active.

New York—Two mills, at Pencoyd and Conshohocken, Pa., has bought about 10,000 tons of No. 2 heavy melting steel, the latter paying $9.50, delivered. This is the first activity on the part of eastern mills since the recent embargo on shipments. In the immediate New York territory buying is limited largely to exports and about 20,000 tons has been placed recently. Prices are unchanged on steel grades.

St. Louis—Iron and steel scrap continue to mark time, new buying being practically absent and both consumers and sellers being disposed

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to await developments. Contracts have been considerably reduced since the first of this month, shipments having continued heavy, with little new business to offset. No revisions have been made in price, but quotations on a number of items are purely nominal.

Toronto, Ont.—Trading in iron and steel scrap is spotty with special grades featured. Export shipments are still being made, but new orders on this account are falling off. Export demand calls for heavy melting steel and other steel lines, but there is little movement in this class for domestic use. Foundries are buying regularly and iron grades maintain fair demand.

Cincinnati—Weakness prevails in iron and steel scrap and prices are nominally lower. Mills are generally well supplied and buy only at concessions.

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Equipment

Sheet & Tube Buys Motors: Broader Demand Is Noted

Pittsburgh—Following an order similar in some respects from the Inland Steel Co., Youngstown Sheet & Tube Co. also has placed with the Westinghouse Electric Mfg. Co., East Pittsburgh, Pa., auxiliary motors, control equipment and two 600-horsepower reel motors for its new cold-rolled strip mill at Indiana Harbor, Ind. Order is said to involve over $60,000. The steel mill roll market was enlivened a week ago by the purchase of 20 tin mill rolls by a West Virginia mill. The order is said to have involved almost $40,000. These rolls are of a special composition and are to be finished to an extremely narrow size tolerance. Motors, lock equipment, machinery and other miscellaneous equipment will be required soon for a large roller crest dam to be built at Montgomery island in the Ohio river below Beaver, Pa. A sum of $2,500,000 has been allotted to construct the dam. Bids will be asked soon.

New York—Inquiry and orders for machinery have gained. Interest is confined almost entirely to special machinery. Orders are mostly for one or two units, but demand is broader and covers more industries. Japan has placed additional business, including crankshaft lathes.

Boston—Inquiry for metalworking machinery is light. Buying is largely for special machinery and is not heavy. Four single-spindle automatic screw machines are up for Newport, R. I., navy shops, closing Oct. 3. Textile mill equipment builders continue active, one of the largest operating at 80 per cent capacity with orders to continue this rate practically the balance of the year. The spurt in textile machinery has been due largely to replacement of obsolete equipment and is well distributed among northern and southern mills.

Chicago—Demand continues spotty, with little improvement noted in orders for larger units. Demand for small tools is holding fairly well and manufacturers of some miscellaneous equipment report business in steady volume. Foundry equipment sales have shown a fairly marked gain over recent weeks, business being confined principally to the smaller types of materials. Railroad demand continues light. The Seaboard Airline railroad is inquiring for a shaper and forging machine, while Illinois Central railroad has placed four electric welders.

Warehouse

Little Change In Demand; Prices Await Code Approval

Pittsburgh—Sales still are lagging and little change is noted in demand for heavy hot-rolled products. Prices on bars and small shapes are based on 2.60c, local warehouse, with shapes and plates 2.85c. Sheet prices are holding and new gage differentials on hot-rolled and galvanized sheets are in effect.

Chicago—Warehouse sales are fairly steady but volume is smaller than a month ago. Demand is more evenly distributed than in August.

Cleveland—The volume of warehouse business here generally remains on a par with, and in some instances is slightly ahead of, the comparable period last month. The warehouse code has not yet been approved in its entirety, and prices are unchanged.

New York—Warehouse volume has tapered slightly and most jobbers' sales are below last month. Prices are steady and unchanged.

Philadelphia—Attempts by a labor organization to bring drivers into its union have disturbed truck deliveries out of warehouses here. Meanwhile, jobbers' prices are unchanged and demand shows little variation.

Baltimore—Except for an advance of $5 a ton in No. 24 black sheets, jobbers' prices here are unchanged. The new price is 3.50c on 50 bundles and over. On 10 to 49 bundles the price is 3.60c and on one to nine bundles, 3.90c. Demand is fairly steady but light.

Detroit—Nails out of warehouse are now quoted at $2.80. Cash discounts have been revised to ½ of 1 per cent. September warehouse business is showing a slight increase over August.

Cincinnati—Warehouse quotations are unchanged in spite of mill advances. Buying is close to the August level, with no definite trend.

St. Louis—Developments in iron and steel warehouse business this month reflect no notable changes from August. Sales are holding up well, and prices are unchanged.

Ferromanganese Price Due

Ferroalloy Prices, Page 80

Ferromanganese sellers are expected to announce fourth quarter prices this week. Although they have withheld comment, the trade generally expects an advance over the current $82, seaboard price. Domestic spiegeleisen, 19 to 21 per cent, is steady at $27, furnace, for spot.

Warehouse Quotations at Leading Centers, in Cents Per Pound

STEEL BARS

Baltimore* ...	2.60c
Boston††	2.65c
Buffalo	2.95c
Chattanooga ..	3.00c
Chicago	2.75c
Cincinnati	3.00c
Cleveland	2.75c
Detroit	2.85c
Houston	2.40c
Los Ang.	3.30c
New Orleans	3.00c
New York‡ (d)	3.10c
Philadelphia*	2.60c
Pittsburgh	2.60c
Portland	3.15c
San Fran.	3.35c
Seattle	3.15c
St. Louis	3.00c
St. Paul	3.00c
Tulsa	3.25c

IRON BARS

Baltimore* ...	2.60c
Boston	3.25c
Chattanooga ..	3.00c
Chicago	2.75c
Cincinnati	3.00c
Detroit	2.85c
New York‡(d)	3.10c
Philadelphia*	2.60c
St. Louis	3.00c
Tulsa	3.25c

REINFORC. BARS

Baltimore	2.35c-3.00c
Boston	2.75c-3.25c
Buffalo	2.95c
Chattanooga	3.00c
Cincinnati	3.00c
Cleveland	2.00c-2.45c
Detroit	2.85c
Houston	3.00c
Los Ang. cl.	2.10c
New Orleans	3.00c
New York	2.65c-3.10c
Phila.	2.62½c
Pittsburgh	2.60c
Seattle	3.15c
St. Louis	3.15c
Tulsa	3.25c
Young.	2.30c-2.60c

SHAPES

Baltimore* ...	2.60c
Boston††	2.75c
Buffalo	3.20c
Chattanooga ..	3.20c
Chicago	3.00c
Cincinnati	3.25c
Cleveland	2.95c
Detroit	3.10c
Houston	2.65c
Los Ang.	3.30c
New Orleans	3.50c
New York(d)	3.10c
Philadelphia*	2.60c
Pittsburgh	2.85c
Portland	3.15c
San Fran.	3.35c
Seattle	3.15c
St. Louis	3.25c
St. Paul	3.25c
Tulsa	3.50c

PLATES

Baltimore* ...	2.60c
Boston††	2.75c
Buffalo	3.20c
Chattanooga ..	3.20c
Chicago	3.00c
Cincinnati	3.25c
Cleveland, ¼ in. and thicker	2.95c
Cleve., 3/16-in	3.20c
Detroit	3.10c
Det., 3/16-in.	3.10c
Houston	3.00c
Los Angeles ..	3.30c
New Orleans	3.50c
New York (d)	3.30c
Philadelphia*	2.60c
Phila. floor....	4.35c
Pittsburgh	2.85c
Portland	3.15c
San Fran.	3.35c
Seattle	3.15c
St. Louis	3.25c
St. Paul	3.25c
Tulsa	3.50c

NO. 10 BLUE

Baltimore* ...	2.75c
Boston††	2.65c
Buffalo	3.10c
Chattanooga ..	3.44c
Chicago	2.85c
Cincinnati	3.05c
Cleveland	2.75c
Det., 8-10 ga.	2.90c
Houston	3.35c
Los Ang.....	3.45c
New Orleans	3.50c
New York	3.00c
Portland	3.75c
Philadelphia*	2.75c
Pitts.**	2.85c
San Fran.	3.53c
Seattle	3.75c
St. Louis	3.10c-3.25c
St. Paul	3.45c
Tulsa	3.70c

NO. 24 BLACK

Balt.*†	3.50c
Boston††	3.75c
Buffalo	3.25c
Chattanooga ..	3.50c
Chicago	3.45c
Cincinnati	3.60c
Cleveland	3.25c
Detroit	3.30c
Los Ang.	4.05c
New York	3.65c
Philadelphia*†	3.30c
Pitts.**	3.40c
Portland	4.50c
San Fran.	4.15c
Seattle	4.50c
St. Louis	3.60c
St. Paul	3.695c
Tulsa	4.75c

NO. 24 GAL. SHEETS

Balt.*†	3.75c
Buffalo	4.00c
Boston††	4.25c
Chattanooga ..	3.95c
Chicago	4.00c-4.10c
Cincinnati	4.15c
Cleveland	3.85c
Detroit	3.85c
Houston	3.57c
Los Ang.	4.65c
New Orleans	4.25c
New York	4.00c
Pitts.**	3.75c-4.00c
Portland	5.00c
San Fran.	4.75c
Seattle	5.00c
St. Louis	4.25c
St. Paul	4.19c
Tulsa	5.10c
Philadelphia*†	3.75c

†BANDS

Baltimore	2.90c
Boston††	3.15c
Buffalo	3.30c
Chattanooga ..	3.20c
Chicago	2.95c
Cincinnati	3.20c
Cleveland	3.00c
Det. 3/16-in. & lighter	3.15c
Houston	2.85c
Los Ang.	3.80c
New Orleans	3.20c
New York(d)	3.30c
Philadelphia...	2.90c
Pittsburgh	2.95c
Portland	3.65c
San Fran.	3.15c
Seattle	3.65c
St. Paul	3.20c
Tulsa	3.45c
St. Louis	3.20c

†HOOPS

Baltimore	2.80c
Boston	4.90c
Buffalo	3.55c
Chicago	3.50c
Cincinnati	3.75c
Det. No. 14 & lighter	3.65c
New York	3.30c
Philadelphia...	3.15c
Pittsburgh	3.60c
Seattle	5.15c
St. Paul	3.75c

COLD FIN. STEEL

Baltimore (c)	3.33c
Boston (g)....	3.70-4.20c
Buffalo	3.00c
Chattanooga*	3.90c
Chicago	3.25c
Cincinnati	3.57c
Clevel'd, flats	3.40c
Do., rounds squares, hexagons	3.25c
Detroit	3.40c
Los Ang.	5.85c
New Orleans ..	4.25c
New York	3.79c
Philad. (c)	3.35c
Pittsburgh	3.20c
Portland (f) ..	4.50c
San Fran. (d)	5.85c
Seattle (f)	4.50c
St. Paul	3.20c
St. Louis	3.61c
Tulsa	4.65c

COLD ROLL. STRIP

Boston 0.100 in., 500 lb lots	5.20c
Buffalo	5.25c
Chicago (b) ..	5.65c
Cincinnati	5.80c
Cleve. (b)	5.55c
Detroit	5.40c
Phila. (c)	4.55c
New York	4.55c

(a) Rounds, hex, only.
(b) Net base straightening, cutting boxing 1 ton or more.
(c) Plus mill, size and quantity extras.
(d) Minus quant. diff.
(e) New mill classif.
(f) Rounds only.
(g) Bessemer analysis extras not included

‡Domestic bars.
*Plus quan. extras.
**Under 25 bundles.
*†50 or more bundles.

†New extras apply.

††Base 40,000 lbs., extras on less.

Prices at Detroit, Cleveland, New York, Chicago, Pittsburgh Cincinnati, Chattanooga and St. Louis on heavier lines are subject to new quantity differentials:

399 pounds and less, up 50 cents; 400 to 3999 pounds, base; 4000 to 7999 pounds, 15 cents off; 8000 to 14,999 pounds, 30 cents off; 15,000 to 39,999 pounds, 50 cents off; 40,000 pounds and over, 60 cents off.

Men of Industry

(*Concluded from Page* 19)

United States brewing practice. He has been prominently identified with the Associated Advertising Clubs of the World as a lecturer and has contributed several articles to business papers on various phases of merchandising.

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J. W. Erb has been appointed general manager in charge of operations of the Wheeling Steel Corp.'s Yorkville, O., plant. He formerly was superintendent of the tin room.

□ □ □

B. A. Johnston, has been appointed sales manager by the Swedish Gage Co. of America, with headquarters at 7310 Woodward avenue, Detroit. He formerly was assistant sales manager of the Continental Tool Works division of the Ex-Cell-O Aircraft & Tool Corp., Detroit.

□ □ □

R. W. Glasner, recently president of the Marquette Tool & Mfg. Co., Chicago, has formed the Clearing Machine Corp., which has taken over the building at 6499 West Sixty-fifth street, Chicago, formerly occupied by the Marquette company, for the manufacture of sheet metal stamping equipment.

□ □ □

Edwin H. Kettnauer, Los Angeles, has been appointed by the Climax Molybdenum Co. as its representative for the Pacific coast territory. The company's office and warehouse are located at 1341 South Hope street, Los Angeles, and are now under Mr. Kettnauer's supervision. Mr. Kettnauer is chairman of the Los Angeles chapter of the American Society of Steel Treating.

□ □ □

Carl G. Ohlson has joined the staff of the Aetna-Standard Engineering Co., Youngstown, O., as vice president in charge of engineering. For the past three years Mr. Ohlson has been connected with the Morgan Construction Co., Worcester, Mass., and previous to that time was with the Youngstown Sheet & Tube Company, Youngstown.

□ □ □

Emory M. Vehmeyer, Detroit manager of Joseph T. Ryerson & Son Inc., was guest of business associates at the Black River Country club Sept. 16 in celebration of his twenty-fifth anniversary with the company. H. B. Ressler, vice president, and A. Y. Sawyer, sales promotion manager, from Chicago, joined the group.

□ □ □

John D. Wise recently resigned as assistant sales manager of the Osborn Mfg. Co., Cleveland. Mr. Wise was graduated from Mississippi Agricultural and Mechanical college, Starkville, Miss., in 1915 and then spent two years with the Robbins & Myers Co., Springfield, O. Following the war he became connected with the engineering department of the Osborn company, and in 1921 he was made superintendent of the foundry laboratory, University of Illinois, Urbana, Ill. In 1922 he returned to the Osborn company, being employed in the sales department. In 1929 he was made assistant sales manager.

□ □ □

Gordon Fox, who has been associated with the Leningrad staff of Freyn Engineering Co., Chicago, has returned to the United States, and will resume his American activities for the company. He devoted the past five years to engineering work in the Soviet Union, during which time his company, in association with the Russian organization, Gipromez, supervised the development of the steel industry of the Soviet Union, and directed the design of blast furnaces, open-hearth and bessemer works, rolling mills and associated departments for all the major plants in Russia. Mr. Fox was identified with the power and electrical phases of this work.

□ □ □

Allen DeVilbiss Gutchess, president of the DeVilbiss Co., Toledo, O., sailed Sept. 15 for a month's business trip in England and France. In London Mr. Gutchess will attend the annual meeting of the Aerograph Co. Ltd., the DeVilbiss English affiliate. In Paris he will inspect the DeVilbiss branch office

□ □ □

W. T. Filmer, for many years associated with the Youngstown Sheet & Tube Co., Youngstown, O., and formerly fire prevention director, has been appointed supervisor of safety for the company's plants in the Youngstown district.

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Everett Chapman, vice president in charge of engineering, Lukenweld Inc. division, Lukens Steel Co., Coatesville, Pa., will be guest speaker at a meeting of the Newark chapter, American Society for Steel Treating at the Elks' club, Newark, N. J., Oct. 9.

□ □ □

Joseph H. Clough has been elected president of the General Electric X-Ray Corp., Chicago, succeeding C. F. Samms, who has become chairman of the board. Mr. Clough was formerly assistant to the president and was located at Schenectady, N. Y., where he contacted the X-Ray unit and the research laboratory of the General Electric Co.

□ □ □

Gilbert L. Yetter, formerly materials engineer in the bureau of construction and repair, navy department, has been appointed welding engineer for the bureau of reclamation, department of the interior, assigned to the Boulder Canyon project. Mr. Yetter is supervising the inspection of the fabrication of the welded steel penstocks being manufactured for the project.

□ □ □

Gerald Firth has succeeded his father, Louis J. Firth, as president of the Firth-Sterling Steel Co., McKeesport, Pa., and also remains as general manager. The elder Firth has been president for the past 34 years and now is vice chairman. Attorney Donald G. Clark, director of sales, has been made vice president. David E. Jackman has been re-elected treasurer and E. D. Grace secretary. James W. Kinnear Jr. has been elected a director, succeeding Eben B. Clark, the

IF you have a problem of removing iron, in any form, where detrimental to your product or for profitable iron recovery, consult the Stearns Testing Laboratory. Regardless of your past experience, it pays to submit your problems to specialists, because of new developments and research in magnetic separation. Write for bulletin "The House of Magnetic Magic" describing the service in detail, or send samples of your product for test.

MAGNETIC MFG. CO.

Dept. TL 650 S. 28th St., Milwaukee, Wis.

(Builders of Stearns Magnetic Equipment)

retiring vice president of the firm.

A. B. Corbin, general manager of the Globe Steel Co., subsidiary of the Firth-Sterling company, now is sales manager of the Firth-Sterling company.

□ □ □

Donald J. Reese has been appointed manager of the foundry equipment division, Whiting Corp., Harvey, Ill. Mr. Reese has been in the company's employ since 1920, and for several years was in active charge of the gray iron and steel foundry at the Harvey plant. He is a member of the American Foundrymen's association, vice president of the Chicago Foundrymen's club.

E. C. Rice has been appointed manager of the crane division of the Whiting Corp. Soon after graduation from Ohio Northern university in 1920, Mr. Rice entered the employ of the company as a special apprentice, and after thorough training in shop practice, became permanently connected with the estimating and engineering departments.

□ □ □

Grant B. Shipley, Koppers building, Pittsburgh, has resigned as president of the following companies: Wood Preserving Corp., Century Wood Preserving Co.. National Lumber & Creosoting Co., and Carolina Wood Preserving Co. He has been elected chairman of the board of directors of the Wood Preserving Corp. Mr. Shipley also has been connected with the mining industry for many years, in which capacity he was associated with the Mond Nickel interests of England, Canada and the United States and, since the consolidation of the Mond Nickel Co. and the International Nickel Co., he has been a director and a member of the executive committee of the International Nickel Co. of Canada.

Mr. Shipley will be succeeded as president of the Wood Preserving companies by Arthur W. Armstrong, now executive vice president of these companies, and also president of the Ayer & Lord Tie Co., Chicago.

September Ore Shipments Continue Upward Trend

Iron Ore Prices, Page 80

Cleveland—Shipments of iron ore from upper lake ports so far in September are at the rate of 5,500,000 tons for the month, compared with 5,100,000 tons moved in August. By Oct. 1, reports to the Lake Superior Iron Ore association indicate, the total this season will be 16,300,000 tons. October and November shipments are expected to raise this well over 20,000,000 tons. At present it is believed December will be light.

Although the number of lake vessels in commission Sept. 15 was 217, unchanged from Aug. 15, the list of those engaged in carrying iron ore was increased from 185 to 199. On Oct. 1 last year only 24 were in the ore trade.

Ore consumption in August was slightly lower than in July, though more than four times the consumption in August last year. Despite steadily mounting shipments this year, stocks at lower lake ports and furnaces Sept. 1 were 2,007,776 tons less than on the comparable date last year. The Ore association's current report follows:

	Tons
Consumed in July	2,262,392
Consumed in August	2,611,903
Decrease in August	14,390
Consumed in August, 1932	606,961
On hand at furnaces, Sept 1, 1933	25,260,351
On Lake Erie docks, Sept. 1, 1933	4,895,524
Total at furnaces and Lake Erie docks, Sept. 1, 1933	30,155,875
Total, Sept. 1, 1932	32,163,651

Railroads

Government Aid May Be Near; New York Central Rails Let

Track Material Prices, Page 79

Purchase of railroad equipment by the government is under consideration at Washington, figures having been gathered indicating the railroads could use $700,000,000 worth of equipment they are unable to finance. Possession of this equipment would mean economy of operation. The government attitude is that this would be assistance to the roads in anticipating assured needs and an aid to general industry at the same time. Some observers believe the program may develop by late October.

New York Central has placed for immediate rolling 8230 tons of steel rails. Earlier in the year it ordered 9300 tons, a total of 17,530 tons. This total is divided as follows: Illinois Steel Co., Chicago, 7860 tons, Bethlehem Steel Co., Bethlehem, Pa., 6090 tons, Inland Steel Co., Chicago, 1790 tons, Algoma Steel Co., Sault Ste. Marie, Ont., 1790 tons. Chesapeake & Ohio has distributed among a number of suppliers the track fastenings and specialties to accompany its recent purchase of 31,481 tons of rails.

Santa Fe is a prospective buyer of 35,000 tons of steel rails. Seaboard Air Line has withdrawn its inquiry for 11,000 tons of steel rails temporarily as it was not able to supply information as to destination and definite requirements demanded under the steel code.

Pressed Steel Car Co., McKees Rocks, Pa., is testing five sample freight cars two tons lighter than the standard, of 50 tons capacity, convertible to 40-ton by change of trucks. Side doors, ends and trucks are of new design.

Car Orders Placed

Inland Steel Co., Chicago, twelve 70-ton flat cars, to General American Transportation Corp., Chicago.

Stauffer Chemical Co., New York, one 10,000-gallon insulated tank car, to General American Transportation Corp., Chicago.

Locomotives Placed

Weyerhaeuser Timber Co., one 2-8-8-2 type locomotive, to Baldwin Locomotive Works, Eddystone, Pa.

Car Orders Pending

Alaska railroad, 10 dump cars, Magor Car Corp., New York, low; 10 coal cars, Pacific Car Co., Seattle, low.

Locomotives Pending

Texas Co., one 0-4-0 type switch engine.

Tin Plate Demand Slower; Operations May Be Reduced

Tin Plate Prices, Page 78

Pittsburgh—The end of capacity operations in tin plate mills in this district appears to be in sight. Producers recently at capacity now appear to have on the average but three to four weeks of orders for such operations. Next month sees the beginning of the canmakers' dull season, and it would not be unreasonable to expect mill operations here to be lower by that time. Inquiries have declined and there is little test of the spot price at $4.65.

Semifinished Reaffirmed; Some Freight Rates Reduced

Semifinished Prices, Page 80

Despite price increases in finished hot-rolled products, semifinished steel is holding for the fourth quarter at $26 base, Pittsburgh, for sheet bars, billets and slabs. Elimination of $24 prices to preferred buyers on sheet bars has contributed an advance. Forging quality billets remain $31. Wire rods were reaffirmed at $35 ten days ago.

New railroad freight rates on sheet bars and slabs from Cleveland to Pittsburgh, Detroit, Wheeling and other points have been announced, effective Oct. 1. On sheet bars from Cleveland to Pittsburgh the rate will be $2.52 a ton, against a former rate of $3.02, which included a surcharge expiring Oct. 1. The rate at $2.52 also will apply to Wheeling, W. Va., Carnegie, Pa., Martins Ferry, O., and other points. The rate from Cleveland to Canton, O., now a sheet bar basing point, will remain $1.64. The rate on slabs from Cleveland to Detroit will be $2.62.

Nonferrous Mill Products

Base price cents per pound f.o.b. mill except otherwise specified. Copper and brass product prices based on 9.00c, Conn., for copper

Sheets

Yellow brass (high)	14.75
Copper, hot rolled	17.12½
Lead sheets, cut to jobbers	8.25
Zinc sheets (100-lb. base)	9.00

Tubes and Pipes

Seamless yellow brass (high)	16.37½
Seamless copper	16.62½

Rods

Yellow brass (high, full turnings)	12.25
Naval brass	13.37½

Anodes

Copper, untrimmed	14.50

Wire

Yellow brass (high)	14.75

Old Metals

Dealers' buying prices, cents lb

No. 1 Composition Red Brass

New York	5.00 to 5.25
Chicago	4.62½ to 4.87½
Cleveland	5.50 to 5.75
St. Louis	4.50 to 4.75

Heavy Yellow Brass

New York	3.75 to 4.00

Heavy Copper and Wire

New York	6.75 to 7.00
Chicago, No. 1	6.00 to 6.50
Cleveland	5.75 to 6.50
St. Louis	5.25

Composition Brass Borings

New York	4.75 to 5.00

Yellow Brass Tubing

Cleveland	4.00 to 4.25

Light Copper

New York	5.50 to 5.75
Chicago	4.75 to 5.25
Cleveland	5.25 to 5.75
St. Louis	5.00

Light Brass

Chicago	3.00 to 3.25
Cleveland	3.00 to 3.50
St. Louis	2.75 to 3.00

Lead

New York	3.50 to 3.62½
Cleveland	3.00 to 3.50
Chicago	3.12½ to 3.37½
St. Louis	3.25 to 3.50

Zinc

New York	2.25 to 2.50
Cleveland	2.25 to 2.75
Chicago	2.50 to 2.75
St. Louis	2.75 to 3.00

Aluminum

Clippings, new, soft, Cleve.	13.00 to 14.00
Borings, Cleveland	5.00 to 6.00
Mixed cast, Cleveland	8.25 to 8.75
Mixed cast, St. Louis	8.00 to 8.50

Secondary Metals

Brass ingot, 85-5-5-5	9.00
Remelt aluminum No. 12	12.75 to 13.75

Metals

Markets Generally Stronger—Zinc Up $2 a Ton—Lead Most Active—Codes Hold Interest

New York — Nonferrous metals were generally stronger during the past week. Copper and lead were firm. Zinc advanced $2 a ton. Antimony moved higher, as did tin as the value of the dollar dropped abroad. Lead again was the most active. Other metals moved in light to moderate volume.

Codes again were of chief interest in the trade. Further meetings were held nearly every day last week. The copper industry probably is furthest from agreement on a code due to the differences of custom smelters and mine producers. The lead code hearing has been tentatively set for Oct. 4. The zinc hearing is expected to take place about the same time.

Copper—Tone of the market was firmer, but custom smelters were willing to sell through first quarter of 1934 at the 9-cent level. Mine producers quoted through December. Total business for the week was comparatively light despite increased consumer interest. Russia is negotiating for 100,000 tons of copper in this country, but credit difficulties are expected to prove a bar to the transaction.

Lead—The metal again was the most active on the nonferrous list. Consumers recently have shown more disposition to cover ahead. September needs now are 95 per cent covered and those for October 75 per cent. October is shaping up better than September and lead sellers see this as an indication of generally better business during that month.

Zinc—Prime western advanced $2 a ton at the beginning of the period and held firm at the higher level of 4.75c, East St. Louis. Most sellers were quoting only through October, but metal could be had at the same figure through December.

Tin—Straits reached approximatelyly the 48-cent level as sterling exchange rose in terms of the dollar. Trading generally was restricted due to price uncertainty. Fair sales of English refined were reported.

Antimony—Spot firmed up to around the 7-cent level but business was negligible.

Coke By-Products Firm

New York—Demand for distillates has stepped up slightly. Most distributors are unable to take on spot business and are meeting contract shipments with difficulty as available material is reaching the market slowly. Prices are firm and unchanged. Sulphate of ammonia prices for October will remain unchanged.

Coke By-Products

Per Gallon Producers' Plants, Tank Lots

	Spot
Pure benzol	$0.22
90 per cent benzol	0.22
Toluol	0.30
Solvent naphtha	0.26
Commercial xylol	0.26

Per Pound at Producers' Plants in 250-Pound Drums

Phenol	0.153 to 0.173

Per Pound at Producers' Plants

Naphthalene flakes	4.75 to 5.75
Naphthalene balls	4.75 to 5.75

Per 100 Pounds Atlantic Seaboard

Sulphate of ammonia	$1.20

Quicksilver Stronger

New York—Quicksilver prices are firmer on an inflationary tendency in this country. Small lots for spot delivery are $64.50 to $65.50, with larger quantities available at about 50 cents less.

Capital expenditures of American railroads for the past 12 years have averaged $727,000,000 annually.

Nonferrous Metal Prices of the Week, Cents a Pound

Spot unless otherwise specified

	Copper, Electro., del. Conn.	Copper, Lake, del. Midwest	Copper, Casting, refinery	Straits Tin, New York, Spot	Straits Tin, New York, Futures	Lead, New York	Lead, East St. L.	Zinc, St. L.	Aluminum, 98-99%	Antimony, Spot, N. Y.	Ingot Nickel
Sept. 16	9.00	9.12½	8.75	47.25	47.62½	4.50	4.35	4.65	*22.90	6.75	35.00
Sept. 18	9.00	9.12½	8.75	47.87½	48.62½	4.50	4.35	4.75	*22.90	6.75	35.00
Sept. 19	9.00	9.12½	8.75	47.87½	48.30	4.50	4.35	4.75	*22.90	6.87½	35.00
Sept. 20	9.00	9.12½	8.75	47.87½	48.25	4.50	4.35	4.75	*22.90	7.00	35.00
Sept. 21	9.00	9.12½	8.75	47.75	48.15	4.50	4.35	4.75	*22.90	7.00	35.00
Sept. 22	9.00	9.12½	8.75	47.60	48.00	4.50	4.35	4.75	*22.90	7.00	35.00

*Nominal quotation. Market range 19.90c to 22.90c

Pacific Coast

Bookings Show Gain and New Inquiry Is Good—Code Price System Is In Effect — Cast Pipe Demand Held Back For Financing — Bridge Needs To Take Fair Tonnages

San Francisco—(*By Air Mail*)—The structural steel shape market is the most active, over 3000 tons being placed in 11 projects. Buying of steel for stock remains quiet as most consumers bought heavily just before the rise.

All material now is being quoted on a delivered basis. In figuring the delivered price the basing point is f.o.b. cars, Pacific docks, plus the all rail freight rate inland. The delivered price within the switching limits of San Francisco is 50 cents a ton additional.

Awards of reinforcing steel bars aggregated close to 1200 tons. Larger lots included 324 tons for San Gabriel Dam No. 1, Los Angeles, placed with Graham Bros. The Pacific Coast Steel Corp. secured 151 tons for a conduit on Venice boulevard, Los Angeles, and 150 tons for a brewery in San Francisco. Colorado Fuel & Iron Co. and Pacific Coast Steel Corp. were low bidders on 2800 tons and 1200 tons, respectively, for Boulder dam. Pending business exceeds 6500 tons.

Consolidated Steel Corp. booked 600 tons of plates for tanks for the Union Oil Co. at Oleum, Calif., and the Western Pipe & Steel Co. secured 157 tons for a 60-inch welded steel pipe line for the Hetch Hetchy project, San Francisco. No action has been taken on 3000 tons for a ship for Swayne & Hoyt, San Francisco. Bids open Sept. 28 for 200 tons for three 250-horsepower boilers for the San Diego naval operating base. Prices are firm at 2.15c, f.o.b. cars, dock.

Structural shape awards were the heaviest in six weeks. Virginia Bridge & Iron Co. took 1200 tons for gates for the Madden dam, Panama. McClintic-Marshall Corp. booked 250 tons for a factory on Mines avenue, Los Angeles. Pacific Iron & Steel Co. secured 110 tons for a library at San Marino, Calif., and 100 tons for an art gallery in Pasadena, Calif. Over 5500 tons is now up for figures. Bids have been opened on 680 tons for the Russian river bridge in California. Wide flange material holds at 2.25c, f.o.b. cars, dock, and standard shapes are 2.15c.

Seattle Sales Maintained

Seattle — Pacific coast uniform warehouse prices became effective this week. They establish four brackets, based on weight and quantities. For 400 to 10,000 pound sales, bars, shapes and plates are raised from 2.15c to 2.40c. Under 300 pounds the price is 3.90c, and in proportion under other brackets. Sheets are down a trifle with new extras. Shafting is unchanged. Some differentials are not yet clear and another meeting will be held at San Francisco, Sept. 21, to adjust matters.

The week's awards included 140 tons of reinforcing to Pacific Coast Steel Corp., Seattle, for two state bridges. United States Pipe & Foundry Co., Burlington, N. J., booked 125 tons of 12-inch centrifugal cast iron pipe for Tacoma, Wash. About 3000 tons of structurals is involved in the proposed machine shop at the Puget Sound navy yard, bids Oct. 9. The following day the same yard will open bids for 12,600 feet of 10-inch cast iron pipe, approximately 425 tons. Spokane, Wash., opened bids Sept. 19 for a $90,000 hangar. An appropriation of $1,000,000 federal funds is announced for preliminary work at the Coulee, Wash., dam project. The government has declined to aid Seattle waterfront projects.

Steel in Europe

Steady Gain Is Apparent; British Mills Gain Backlog

London — (*By Cable*) — Business is slowly improving, especially in steel. Mills rolling soft steel billets are in arrears with deliveries, sheet bars are dearer, and steel scrap has been advanced, but with no pressure for supplies. Buyers show much caution. Shipbuilding materials are showing some improvement. Middlesbrough pig iron makers are preparing to relight furnaces, as stocks of iron are dwindling.

Reports from the Continent are that the situation is unchanged, except that French ingot production in August showed an increase over that of July and Germany has experienced a slight expansion in exports.

Current Iron and Steel Prices of Europe

Dollars at Rates of Exchange, Sept. 21

Export Prices f.o.b. Ship at Port of Dispatch—By Cable (or Radio)

	British gross tons U. K. ports		Continental Channel or North Sea ports, metric tons Gold parity, $4.8665	
		£ s d		£ s d
PIG IRON				
Foundry, 2.50-3.00 Silicon	$14.04	2 18 6	$8.27	1 14 0
Basic bessemer	12.96	2 14 0*	7.30	1 10 0
Hematite, Phos. .03-.05	14.16	2 19 0	....	.....
SEMIFINISHED STEEL				
Billets	$25.20	5 5 0	$11.44	2 7 0
Wire rods, No. 5 gage	36.00	7 10 0	21.90	4 10 0
FINISHED STEEL				
Standard rails	$37.20	7 15 0	$26.77	5 10 0
Merchant bars	1.47c	6 17 6	.66c	3 0 0
Structural shapes	1.58c	7 7 6	.61c	2 15 0
Plates, †¼ in. or 5 mm	1.77c	8 5 0	.86c	3 18 6
Sheets, black, 24 gage or 0.5 mm.	1.93c	9 0 0	1.27c	5 15 0
Sheets, gal., 24 gage, corr.	2.35c	11 0 0	1.60c	7 5 0
Bands and strips	1.66c	7 15 0	.83c	3 15 0
Plain wire, base	1.87c	8 15 0	1.18c	5 7 6
Galvanized wire, base	2.25c	10 10 0	1.38c to 1.40c	6 5 6 to 6 7 6
Wire nails, base	2.57c	12 0 0	1.27c	5 5 0
Tin plate, box 108 lbs.	$ 4.02	0 16 9	.....	.....

British ferromanganese $82 delivered Atlantic seaboard, duty-paid. German ferromanganese £9 0s 0d ($43.74) f.o.b.

Domestic Prices at Works or Furnace—Last Reported

		£ s d		French Francs		Belgian Francs		Reich Marks
Fdy. pig iron, Si. 2.5	$15.00	3 2 6(a)	$13.07	215	$13.18	305	$23.37	63
Basic bessemer pig iron	14.16	2 19 0(a)*	11.86	195	12.53	290	25.78	69.50
Furnace coke	3.24	0 13 6	7.30	120	4.75	110	7.14	19.25
Billets	24.00	5 0 0	24.62	405	19.01	440	35.81	96.50
Standard rails	1.77c	8 5 0	1.96c	700	2.20c	1,100(b)	2.22c	132
Merchant bars	1.47c	6 17 6	1.57c	560	1.07c	535	1.85c	110
Structural shapes	1.87c	8 15 0	1.54c	550	1.07c	535	1.81c	107.50
Plates, †¼-in. or 5 mm.	1.82c	8 10 0	1.90c	680	1.35c	675	2.13c	127
Sheets, black	2.14c	10 0 0§	2.38c	850‡	1.50c	750‡	2.42c	144‡
Sheets, galv., corr., 24 ga. or 0.5 mm	2.68c	12 10 0	4.06c	1,450	2.90c	1,450	6.22c	370
Plain wire	1.87c	8 15 0	3.16c	1,130	2.60c	1,300	2.97c	177
Bands and strips	2.03c	9 10 0	1.74c	620	1.35c	675	2.13c	127

*Basic. †British ship-plates. Continental, bridge plates. §24 ga. ‡1 to 3 mm. basic price. British quotations are for basic open-hearth steel. Continental usually for basic-bessemer steel. a del. Middlesbrough. b Since January

Construction and Enterprise

New England

GEORGETOWN, MASS.—Town board of selectmen plans a waterworks system to cost $130,000. Fay, Spofford & Thorndyke, 44 School street, Boston, are engineers.

New York

NEW YORK—Zweifel & Co. Inc. has been incorporated with 100 shares no par value to manufacture machinery appliances, by Ernest M. Garbe, 15 Park Row, New York.

New Jersey

BORDENTOWN, N. J.—City plans a municipal electric light and power plant to cost $75,000. C. Rodgers, Bordentown, N. J., is consulting engineer.

Pennsylvania

PITTSBURGH—West Virginia Fire Clay Mfg. Co., Pittsburgh, will build an unloading dock near New Cumberland, on the Ohio river near Pittsburgh, when permission from the federal government has been obtained.

Ohio

CINCINNATI—A. K. C. Tool Co. has been incorporated with $12,500 capital, by Arthur H. Fix, American building, Cincinnati, and associates.

EAST LIVERPOOL, O.—City council is considering plans for a municipal electric light and power plant to cost about $1,000,000. Shover & Loftus, Oliver building, Pittsburgh, are consulting engineers.

Michigan

ADRIAN, MICH.—City is making surveys for a municipal electric light plant and steam generating equipment. W. Frazier is city engineer.

DETROIT—Goebel Brewing Co., Rivard and Maple streets, is having plans drawn by Harley & Ellington, 1507 Stroh building, for a 2-story plant housing boilers, ammonia compressors, electric motors, coal-handling equipment and stokers, to cost $50,000.

Indiana

MICHIGAN CITY, IND. — Dwyer Products Co. has been incorporated with 1500 shares no par value to engage in the operation of a foundry, by Lawrence P. Dwyer, Horace A. Soper and George Sass.

Illinois

CHICAGO—Electric Maid Inc., 100 West Monroe street, has been incorporated with 100 shares capital stock to manufacture electric household devices, by Adams, Hawley, Brown & Adams, 100 West Monroe street, Chicao.

CHICAGO—Holloway Auto Products Inc., 3701 Cortland street, has been incorporated with 20,000 shares no par value to manufacture automotive accessories, by W. L. Backer and associates, 7 South Dearborn street, Chicago.

CHICAGO—Voge Electric Corp., 105 West Adams street, room 2620, has been incorporated with 100 shares capital stock to manufacture automotive, electrical and mechanical devices and specialties, by B. L. McGregor and associates, 105 West Adams, street, room 2620.

Southern States

WILMINGTON, N. C.—Ethyl-Dow Chemical Co., a subsidiary of Dow Chemical Co., Midland, Mich., William H. Dow president of both, plans a powerhouse, pumping plant and electrical equipment at its new plant at Kure Beach, near Wilmington, to recover bromine from sea water.

MUSCLE SHOALS, TENN.—Tennessee Valley Authority, Llewellyn Evans, Muscle Shoals, Tenn., consulting electrical engineer, will make plans at once for a steel tower transmission line 220 miles long, to the Cove Creek hydroelectric power project.

Missouri

DONIPHAN, MO.—City has retained W. A. Fuller Co., engineer, 2916 Shenandoah avenue, St. Louis, to design a municipal electric light and power plant addition to cost $60,000.

Texas

HOUSTON, TEX.——Todd Shipyards Corp., 25 Broadway, N. Y., plans a steam powerhouse and electric equipment for plant service in its new repair and drydock plant on Houston ship channel. The entire project will cost about $1,000,000.

WICHITA FALLS, TEX.—City, R. V. Smitham manager, will build the first unit of its municipal power plant, costing $350,000. Montgomery & Ward, Harvey-Snider building, Wichita Falls, Tex., are engineers.

Wisconsin

BRILLION, WIS.—Bondholders of the Brillion Iron Works have acquired its assets at receiver's sale and plan to form a new corporation to resume operations in production of a soil pulverizer and do a general jobbing foundry business.

TWO RIVERS, WIS.—City, E. J. Donnelly manager, plans a municipal electric light and power plant to cost $240,000. Burns & McDonnell Engineering Co., 107 West Linwood boulevard, Kansas City, Mo., is engineer.

Minnesota

ST. CLOUD, MINN.—Council is considering construction of a municipal electric light and power plant. Estimates are being made by Burns & McDonnell Engineering Co., 107 West Linwood boulevard, Kansas City, Mo., consulting engineer.

Iowa

GRUNDY CENTER, IOWA—A special election has authorized a fund of $120,000 for a municipal electric light and power plant. H. L. Cory, Baum building, Omaha, is consulting engineer.

Arizona

DOUGLAS, ARIZ.—City, G. G. Childs, city engineer, is making plans for a municipal electric light and power plant to cost about $700,000.

DOUGLAS, ARIZ.—Western Gas Co., El Paso, Tex., will start construction soon of a natural gas pipe line from Douglas to Tucson, Ariz., for the Tucson Gas, Electric Light & Power Co., distributor.

Pacific Coast

SAN FRANCISCO—American Brake Shoe & Foundry Co., 74 New Montgomery street, plans erection of a mill-type foundry building on Tanforan avenue. K. Theill, 580 Market street, is engineer.

SAN JOSE, CALIF.—Continental Can Co., 155 Montgomery street, San Francisco, is reported to consider erection of a plant at Eighth and Taylor streets, to cost about $200,000, after plans by the Austin Co. of California, 1924 Broadway, Oakland, Calif.

SOUTH GATE, CALIF.—Bryant & Shaw, architects, 1610 Cosmo street, Los Angeles, have been retained by Southern California Brewing Co., Oviatt building, Las Angeles, to prepare preliminary plans for a brewery to be erected on a six-acre site, to cost $250,000 for building and $150,000 for equipment.

STOCKTON, CALIF. — Consolidated Petroleum Distributors Co., 315 Montgomery street, San Francisco, plans construction of a refinery on Rough and Ready island, to cost $1,500,000.

SALEM, OREG.—Mayors of cities in the Willamette valley are taking concerted action in planning for a sewage disposal system to clear the Willamette river. Special elections will be called to obtain authority to apply to the state public works administration for funds. Data are being assembled.

PORTLAND, OREG. — Bids have been taken by United States engineers here for dredging the Columbia river below Portland and constructing a turning basin at Vancouver, Wash., an appropriation of $409,500 being available. Heavy dredging machinery will be required.

PORTLAND, OREG.—Pilsener Brewing Co., Seattle, has given a contract to Lorenz Bros., Portland, Oreg., for remodeling a building here for a brewery with 250 barrels daily capacity, to be ready Nov. 1, at a cost of about $180,000. H. R. Fischnaller is president of the Pilsener Brewing Co.

SEATTLE—Commercial Welding Co., 2250 First avenue South, Paul G. Eidsmore, owner, has suffered damage of $11,000 by fire in its plant.